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IS THERE AN URBAN WAGE PREMIUM IN ITALY?

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Abstract

We analyze empirically the impact of urban agglomeration on Italian wages. Using micro-data from the Bank of Italy's *Survey of Household Income and Wealth* for the years 1995, 1998, 2000 and 2002 on more than 22,000 employees distributed in 242 randomly drawn local labor markets (30 percent of the total), we test whether the structure of wages varies with urban scale. We find that every additional 100 employees per square kilometer (100,000 inhabitants) in the local labor market raises earnings by 0.4-0.6 percent (0.1 percent) and that employees working in large cities earn, on average, 2-3 percent higher wages than those in the rest of the economy. The application of spatial data analysis techniques enables us to state that this effect is present only in the large cities surrounded by low-populated areas. We also find that urbanization does not affect returns to experience and that it reduces returns to education and to tenure with current firm, while providing a premium to managers, worker supervisors, and office workers.

JEL classification: R12, J31.

Keywords: Wage Differentials, Urbanization, Agglomeration Externalities, Population Clustering, Spatial Autocorrelation.

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Contents

1. Introduction[1]

While the evidence on the magnitude of the labor-productivity gains generated by agglomeration is fairly consistent across countries, the findings on the extent to which these gains accrue to workers show considerable variation. Thus, while the elasticity of average labor productivity with respect to employment density is estimated to be 5 percent in the US and 4.5 percent in Italy, France, Germany, Spain and the UK (with no significant difference across countries; Ciccone (2002) and Ciccone and Hall, 1996),[2] the estimates of urban wage premia vary widely both across and within countries, depending on the agglomeration variable and dataset used. For instance, the elasticity of wages is about 2 percent large with respect to employment density in the French *zones de emploi* (Combes, Duranton, Gobillon, 2003); it is 2.7 percent with respect to US Statistical Metropolitan Area (SMA) population level (Wheeler, 2001); and it amounts to 10 percent when it is calculated with respect to the Japanese Standard Metropolitan Employment Area population (Tabuchi and Yoshida, 2000).[3]

Furthermore, while Diamond and Simon (1990) find that every additional 1 million inhabitants in the US SMAs increases wages by 1-2 percent, Glaeser and Maré (2001) obtain that in the large US cities earnings are 24-28 percent higher than in rural areas (the premium falls to 13-19 percent in small towns).[4] Even though these last authors find that returns to

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[2] Of course, the differences in productivity can be much larger when comparing specific cities. For instance, New York county's workers are 22 percent more productive than those in the state with the highest average productivity (i.e., New York State; Ciccone and Hall, 1996).

[3] In real terms, the elasticity is negative (between –12 and –7 percent; Tabuchi and Yoshida, 2000).

[4] Large cities are the SMAs containing at least one municipality with more than 500,000 inhabitants, and small cities are the rest of the SMAs.

experience (and to college education) increase with urbanization,[5] part of the average premium from rural-into-metropolitan areas migration is received within the first year after moving. However, after controlling for individual-specific effects the wage premium from moving between metropolitan and non-metropolitan areas is reduced to about 4.5 percent.[6] Finally, Rosenthal and Strange (2005) measure the geographic scope of agglomeration economies by testing wage differentials between concentric rings with rays of variable length centered around each worker, and find that wages increase by 1.8 percent for every additional 100,000 full-time workers within 5 miles (even though the premium disappears after controlling for self-selection in the densest markets).

Among the possible reasons for the great variation in the agglomeration-effect estimates across studies are the different territorial unit of analysis used (also because externalities attenuate rapidly across space) and unmeasured differences in the spatial distribution of the population. Thus, in contrast to the majority of studies, in this paper we use a wide set of agglomeration indicators, and we adopt spatial data analysis techniques (i.e., the *Moran Scatterplot* and the *Local Moran's I Statistics of Spatial Correlation* - see Section 3) to identify the threshold values defining large cities. This methodology is particularly interesting because it enables us to distinguish the effect of living in a large city surrounded by low-populated areas (HL) from that of living in a large city surrounded by highly populated areas (HH). Indeed, according to Ciccone's and Hall's (1996) model, a higher dispersion of employment densities across counties increases productivity, provided that agglomeration effects outweigh congestion effects. To give a quantitative example, the authors find that New York State's productivity would be 19 percent lower if employment was re-allocated uniformly within its counties.

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[5] In this paper we use the term *urbanization* as a synonymous of urban agglomeration, and the term *localization* to broadly mean industrial agglomeration (similarly to Rosenthal and Strange (2004), who take the former to represent the economies arising from the city itself, and the latter as the externalities from the spatial concentration of activity within a certain industry). Other authors, however, take the former (or *Jacobs externalities*) to mean product variety or inter-industry size, and the latter (or *Marshall-Arrow-Romer or MAR externalities*) to mean "sectoral specialization" or industry size.

[6] Besides individual characteristics, individual fixed effects include a person-specific wage-intercept term. Note that all these findings are quite sensitive to the dataset used. For instance, when using the PSID instead of the NLSY, return-to-education differentials disappear and so do premia from rural-to-metropolitan area migration (the latter appear again only after the first three years).

Using a unique dataset of more than 22,000 employees distributed in 242 randomly drawn local labor markets (30 percent of the total) from the Bank of Italy's *Survey of Household Income and Wealth* (SHIW) for the four available years between 1995 and 2002, we find that in Italy earnings rise by 0.4-0.6 percent for each additional 100 employees per square kilometer and by just 0.1 percent for every 100,000-inhabitant increase in the LLM. We also obtain that wages are 2-3 percent higher in large cities than elsewhere, and that this premium is exclusively present in the HL-cities, implying that not only the levels, but also the degree of inequality of the population distribution across LLMs matters in determining agglomeration effects. However, the large-city premium disappears when we also add employment density, which, on the contrary, raises earnings by 0.3-0.5 percent for each 100 employees per square kilometer increase. Somewhat surprisingly, we also find that college graduates prefer living in large cities in spite of earning 7 percent less there than elsewhere.[7] This apparent puzzle could be explained by the presence of heterogeneous preferences (though we cannot directly test this hypothesis). Indeed, it could be the case that, in contrast to the large-city employees with a middle school or a secondary school attainment (who do not suffer nor benefit from wage differentials with respect to their non-urban counterparts), college graduates have preferences for urban consumption amenities strong enough to compensate their wage loss. In general, we find that urbanization does not create monetary incentives to invest in human capital, but "rewards" job qualification. In particular, while urban agglomeration does not affect returns to experience, each additional 100 employees per square kilometer reduces returns to seniority by 0.1 percent, and raises managers' earnings by 1.8-2.1 percent.

While it is now widely recognised that urbanization is an important determinant of average labour productivity, and thus of average wages, its impact on the determinants of earnings is less frequently investigated (and, to our knowledge, it has never been on Italian data). The absence of empirical work on this subject is rather surprising, not only for the interest of the subject *per se*, but also because omitting a measure of city size (when it is significant) would systematically bias all the monetary-return estimates of any variable

[7] Of course, in real terms the income loss is likely to be greater, as the cost of living is normally higher in the largest cities than in the rest of the economy.

correlated to workers' location. In Italy, for instance, omitting city size would cause returns to college degree to be overestimated by 1.3 percent, since one third of college graduates lives in a large city (see Section 4). The magnitude of this bias reaches 36 percent in the US (Black, Kolesnikova and Taylor, 2005), probably because of the higher wage flexibility.

These findings raise a number of policy-relevant issues. First, to what extent does the spatial dispersion of the Italian population constitute an obstacle to growth? On the basis of various empirical studies, Rosenthal and Strange (2004) report that doubling city size increases productivity by 3-8 percent. The fact that we find a lower wage premium could indicate that Italian cities are under-sized, which, according to Au and Henderson (2004), would produce a higher loss of real output per worker than over-size. More research needs to be done on whether it would be desirable or possible to adopt measures to increase the dimension of Italian cities. Second, to what extent will productivity growth eventually be hampered by the presence of negative return-to-education differentials in the Italian large cities? According to Glaeser and Saiz (2003) the most important determinant of urban growth is skill composition. In the last twenty years, the US SMAs with a higher share of educated workers have grown 3.4 times faster than those with a lower proportion of college graduates. More generally, the rising level of educational attainment contributed to almost one-third of US output-per-hour growth (over the period 1950-1993; Jones, 2002). While currently Italian cities do attract highly educated workers, it is legitimate to wonder whether the presence of negative urban wage differentials to college graduates will eventually lower their demand for cities (see Glaeser, 1999) and will thus diminish Italy's productivity growth in the long run.[8] Finally, if the most highly educated Italian workers concentrate in large cities in spite of obtaining lower returns, there must either be consumption amenities that compensate their wage loss or a higher demand of their skills (i.e., a higher probability of finding a job). In the former case, in order to keep attracting high skilled workers city-planners should aim at improving the quality and at increasing the offer of city services

[8] Becker, Ichino and Peri (2003) find that while other large economies have been experiencing a "brain exchange" (both importing and exporting highly educated workers), Italy is the only country of the European Union to experience a "brain drain", large in size and increasing over time. It would be interesting to understand the extent to which this phenomenon can be explained (besides, perhaps, an imperfect recruitment system) by negative college graduate return-to-education differentials in the largest cities (which is where the most highly educated people like to live).

(schools, transportation system, hospitals, etc.). In the latter case, local governments should rather ease regulations, cut business taxes and provide subsidies to attract firms (Adamson, Clark and Partridge, 2004).

The remainder of the paper is organized as follows. Section 2 summarizes previous results from the literature. Section 3 describes the dataset and the agglomeration variables, including the spatial statistics techniques used to determine the large-city thresholds. Section 4 presents the main features of workers and firms in the most highly populated Italian LLMs and describes our sample's main statistics. Section 5 investigates the existence and magnitude of urban wage premia and compares the wage structure in large cities to that in the rest of the economy. Section 6 concludes.

2. Overview of the previous literature

Why should wages be affected by urban agglomeration?

According to the agglomeration literature, in order to exist cities must benefit from local increasing returns or indivisibilities; in order not to explode, they must suffer from some sort of congestion cost. Urban wage premia could be the outcome of either local increasing returns or congestion.[9] In the former case, earnings grow with urban agglomeration because of labor productivity gains. In the latter case, urban wage premia are a compensation that workers receive for bearing a lower quality of life in more congested areas.

Labor productivity gains are mainly generated by (*Marshallian* or *Jacobian*) external scale economies arising from the nearby location of similar firms and specialized workers; they can be of four types. First are economies resulting from intra-industry specialization due to a finer inter-firm division of labor, increasing the number of industrial linkages (including with the service sector). Second are economies due to the cost reductions that result from producers' physical proximity to input suppliers and/or final consumers. Third are externalities due to the greater intensity of communication between agents, which generates knowledge spillovers favoring innovation (technological spillovers) and increasing the speed of learning (intellectual spillovers). Fourth are economies arising from the existence of pooled markets for specialized workers with industry-specific skills (*labor pooling*), which reduce the mismatch between workers' skills and firm's job requirements.[10]

Wages could be also affected by the fact that agglomeration leads to more intense competition, which on the one hand raises producers' or workers' productivity,[11] but on the other hand, might force employees to work "too long" hours in order to signal effort, which could reduce productivity because of diminishing marginal returns (Rosenthal and Strange, 2002). Moreover, in a context of monopsony power,[12] more intense competition may produce wage premia even in the absence of productivity gains, as the greater risk of having their specialized workers poached by competitors might force firms to renounce part of their labor market power - embodying transferable knowledge (see, for instance, Combes and Duranton, 2001).

In the quality-of-life framework, urban wage premia can exist in the absence of labor productivity gains. In this type of compensating-differential model (see Gyourko, Kahn and Tracy (1999) for a review), workers have a preference for amenities (indivisible consumption or public goods) that are profitable to supply only in the largest cities (e.g.,

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[9] Note that there might also be institutional reasons for earnings to be higher in large cities (i.e., urban allowances), but these can be seen as a compensation from local governments for the higher congestion costs.

[10] In this framework, the presence of frictions in the economy lowers the output of matches, equal to the productivity from the perfect match minus the loss from the mismatch between jobs and skills. In Helsely's and Strange's (1990) model, for instance, the expected quality of matches, and thus productivity and wages, increase with the number of firms locating in the city. In Kim (1990), specialization, increasing with the number of workers in the market, improves the average match, reducing the costs that firms have to incur to train the mismatched employees. Note that in the labor-pooling context, agglomeration may increase wages not only by lowering training costs, but also by reducing firms' search costs per worker (as in Wheeler, 2001), or by facilitating the mobility of unsatisfied employees across firms.

[11] For instance, by increasing firms' propensity to innovate (Porter, 1990) or by improving the quality of matches (by facilitating the mobility of workers across jobs).

[12] In the absence of productivity gains, in order to explain why firms do not flee from the largest cities it is necessary to assume the presence of some source of imperfection leading to wages below marginal product (see Stevens, 1994). However, when perfect competition is reached the poaching problem disappears. In contrast, all the agglomeration effects that enhance productivity could also exist in a context of perfect competition (i.e., the requirement being for the bargaining system to be such that at least some of the benefits from higher urban labor productivity are capitalized by workers).

because of increasing returns in the provision of local public services). Amenities can be "productive" (e.g., infrastructures such as airports or public intermediate inputs tailored to firms' specific needs, but also specialized schools and better quality services) or "unproductive" for firms.[13] In these models, rents and wages adjust to make individuals indifferent between locations (Roback, 1982). Thus, rents increase to ration the demand for space in the cities endowed with the best amenities (so as to equalize workers' utility in all locations), lowering wages in real terms. In case of unproductive amenities, wages decrease in nominal terms as well, so as to equalize firms' costs across locations (in order to make them willing to localize where rents are higher). In the case of productive amenities, rents rise by a larger amount, but the net effect on nominal wages depends on the strength of the amenity effect on workers relatively to that on firms. Furthermore, as city size rises individuals' utility declines because of congestion disamenities (i.e., longer commuting, smaller houses, higher cost of living, pollution).[14] Thus, all else equal, the presence of urban wage premia depends on whether workers' (firms') disutility from urban disamenities exceeds (or falls short of) the utility from favorable amenities.

Whatever the source of average wage premia, their distribution might be unequal across educational, experience and seniority groups.

For instance, the most educated workers might benefit more than the least educated employees from knowledge spillovers, better match quality, or improved quality of life. In the first case, the returns to education would increase with urban agglomeration if the latter was associated to higher levels of average human capital (see Moretti, 2004) and those benefited the most educated individuals more than the less skilled ones (see Benabou, 1993).[15] The opposite would occur if the least educated workers had a higher learning

[13] By "unproductive amenities" we mean those increasing workers' utility and either lowering or not affecting firms' marginal costs (e.g., clean air, a wider offer of cultural and sport venues or a larger variety of shopping centers).

[14] Utility should be first increasing and then decreasing in city size.

[15] However, there might ultimately be decreasing returns to the agglomeration of high skills (Benabou (1993); see also Ciccone and Peri, 2000). Note also that in the short term, an imperfect substitution of workers with different levels of human capital could reduce returns to education in the most agglomerated areas by creating an excess supply of highly educated workers in large cities (see Moretti, 2004), forcing some of the

capability (e.g., because they had more to learn; Rosenthal and Strange, 2005). In the second case, the returns to education could increase with urban scale if match quality improved more for the most educated workers than for the least educated ones. In Wheeler (2001), for instance, the density of job seekers in the market on the one hand increases the complexity of search, creating a congestion externality; on the other hand, it reduces firms' search cost per-worker (by enhancing workers' arrival rate per job opening, in the presence of fixed search costs for advertising and interviewing). Thus, provided that the agglomeration benefits outweigh the costs, firms in large cities have a higher reservation quality than elsewhere, and high-quality employers, more desirable for all job seekers, select the highest-skill workers. This mechanism, while improving the efficiency of matches (as capital and worker's skill are complementary), generates greater between-skill-group wage inequality. Third, in the quality-of-life framework the correlation between returns to education and urban agglomeration would be positive if the more-educated (or wealthier) people had a stronger aversion to living in large cities than the less-educated ones (for instance, because they have more to lose from crime; Adamson, Clark and Partridge, 2004); it would be negative if the more educated (or wealthier) people were more willing (or capable) to forego part of their income in exchange for a higher quality of life in the largest cities (Black, Kolesnikova and Taylor, 2005).

Rosenthal and Strange (2005) find evidence of increasing returns to education in the US: after controlling for self-selection, they obtain that college graduates earn 3 percent more for each 100,000 worker-increase within 5 miles, while individuals with a lower educational attainment do not earn any differently. These effects peak at the 5th mile, then drop to 1/2-1/4 before the 25th mile and rapidly attenuate afterwards. In Wheeler (2001), a doubling of the US SMA population increases hourly wages by 4 percent in the sub-sample of the individuals with at least 16 years of schooling (1.3 percent more than for the average worker); by 3 percent for those with 13-15 years of education; and by 2 percent (0.7 percent less than the average premium) for the sub-sample of workers with 9-12 years of education (the less educated workers do not earn any differently). In contrast, after controlling for

most skilled workers to fill vacancies requiring lower levels of qualification (which would worsen the quality of the average match).

employment density Adamson, Clark and Partridge (2004) find evidence of decreasing returns to education[16] (a doubling of the population reduces returns to college degree and to high school attainment by 3 and 2 percent respectively), implying that urban amenities play an important role in the location decisions of the most highly educated workers. The idea that the return-to-education differentials due to urban agglomeration derive from differences in the endowment of cities' consumption amenities is supported by Black, Kolesnikova and Taylor (2005), who find that in the US returns to education are lower in the high-amenity and expensive cities (i.e., San Francisco, Seattle and New York) compared to low-amenity towns (e.g., Houston and Pittsburgh).

Finally, the sign of the correlation between returns to tenure and urban agglomeration is also *a priori* ambiguous. It could be positive for at least two reasons.[17] First, because, in a context of imperfect competition, market size could increase the degree to which on-the-job training is transferable, and thus the risk poaching (see Stevens, 1994), which forces firms to renounce part of their share of the return to training, raising workers' returns to tenure.[18] Second, if firms deferred compensation in the form of wages increasing over time as a strategic device to raise workers' productivity, and if this induced the most productive workers to stay longer with their current employer, returns to seniority would increase with urban scale (as in Topel, 1991). In contrast, if it was the case that the workers with a greater tendency to stay with their employers (even when badly matched) were the bad-quality ones (as in Stevens, 2003), agglomeration - by increasing the length of tenure - would in fact *reduce* returns to seniority.

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[16] In relation to this, Ciccone and Peri (2000) find evidence of a negative correlation between private returns to education and SMAs' endowment of human capital in the US. In particular, each one-year increase in average schooling reduces individual returns to education by 1.4 percent, while raising average labor productivity by 1-11 percent. In contrast, Rosenthal and Strange (2005) find that proximity to high human capital increases average wages: exchanging 10,000 low educated workers with the same amount of college graduates would increase wages within 5 miles by 4.7 percent for the average full-time worker, and by 11.4 percent for the employees with a university degree.

[17] In Beffy at al. (2004) the steepness of the wage-tenure curve increases with the arrival rate of job offers. This model would predict returns to tenure to increase with urban agglomeration, as the latter should raise arrival rates per unit of time.

[18] We are taking returns to tenure to proxy specific returns to training (which is common in the literature). In Stevens' (1994) model, on-the-job training is neither completely specific nor completely general, so that part of its return accrues to the worker, part to his/her employer and part to other firms. The model would also

While there are a number of studies on the differentials in returns to education generated by urban agglomeration, there is much less evidence on the differentials in returns to experience and we have not found any work specifically addressing returns to tenure. In countries with a low horizontal mobility of labor, such as Italy or France, the risk of having one's workers poached is lower than in countries with a high mobility, like the US. Thus, we would expect the increase in the return to seniority deriving from the agglomeration-induced fear of poaching to be lower in Europe than in the US, as workers tend to stay longer in the firm (Beffy at al., 2004). In fact, a longer tenure in large cities with respect to the rest of the economy would generate negative differentials in returns to seniority if it regarded bad-quality workers more than good-quality employees (as in Stevens, 2003). In constrast, if the incidence of training was higher among the most educated workers than among the least educated employees (see Brunello (2001) for some evidence on Europe), and if urban agglomeration increased the supply of highly educated workers (e.g., because of higher returns, as in Wheeler, 2001), urbanization would also raise the propensity to train and therefore returns to seniority.

Last, agglomeration may affect also returns to job qualification. According to Rosenthal and Strange (2002), the elasticity of wages with respect to employment density in the worker's occupation is higher for professionals than for non-professionals (respectively, 5.0 against 3.1 percent for 30-40 year-old individuals, and 6.7 against 3.8 percent for middle-aged workers). Moreover, the more intense rivalry in the largest cities forces young professionals to work harder (i.e., longer hours) than in smaller centers,[19] which could reduce their wages because of fatigue.

The Italian literature has typically focused on regional disparities because of the large labor-productivity gap between the North and the South of the country (the North-South divide). More recent studies have analyzed the impact of industrial agglomeration and have found that *localization* has a depressing effect on the returns to education, while it does not

predict less amount of on-the-job training, a higher component of specific (non-transferable) training and lower worker turnover (longer tenure) in large cities.

[19] This is in line with Kalwij and Gregory (2004), who find that in the UK hourly wage increases raise overtime hours for both men and women. Thus, if agglomeration raises wages it should also increase overtime hours.

affect average wages, returns to experience or to seniority.[20] The lack of studies on the impact of *urbanization* in Italy is rather surprising, because despite the heterogeneity of the literature results, there is now a large consensus on the existence of urban wage differentials. The only study using Italian data tackling in part this issue is Cingano's and Schivardi's (2004), who find that doubling LLM manufacturing employment increases wage growth by 0.1 percent each year.

3. The empirical strategy

3.1 The data set

We test the existence of urban wage premia with a Mincerian wage function (Mincer, 1958) augmented with agglomeration variables. We use data from the biannual *Survey of Household Income and Wealth*, conducted by the Bank of Italy for the years 1995, 1998, 2000 and 2002. This is the only Italian survey that allows the estimation of individuals' returns to education, as it collects information on schooling besides wages, work experience and tenure. We complement this data set with three variables at the local labor market (LLM) level from the Labor Force Survey:[21] the employment density, the population size and the unemployment rate.

Our territorial unit of analysis is the LLM. This choice is essentially motivated by three reasons. First, LLMs are "self-contained" labor markets, since by definition they are characterized by a very high overlap between the residing and the working populations.[22] As a consequence, labor mobility between LLMs is very low (OECD, 2002), which minimizes the endogeneity issues that may arise when one estimates agglomeration effects (see Section

[20] See de Blasio and Di Addario (2005) for a review of the literature and some empirical evidence on wage differentials in Italian Industrial Districts.

[21] We match the SHIW and Labor Force Survey data to LLMs with an algorithm provided by the National Institute of Statistics on the basis of individuals' municipality of residence.

[22] The National Institute of Statistics obtains LLMs from the 1991 Population Census on the basis of the daily commuting flows from place of residence to place of work (Istat, 1997). The condition determining their

5.1.1). Second, LLMs partition the entire national territory, allowing us to draw conclusions with general validity (in contrast to case studies). Third, LLMs are increasingly used as the territorial unit of analysis in the agglomeration literature (see Rosenthal and Strange (2004) for a survey) and are now available in a number of countries (including the UK's Travel-to-Work Areas and the French *zones d'emploi*).[23]

How to define and measure urban agglomeration is a matter of investigation in itself. In the literature there is not much agreement on which is the best proxy. According to Ciccone and Hall (1996) and Ciccone (2002), for instance, employment density captures the agglomeration externalities on labor productivity better than city or industry size, while for other authors (see, for instance, Moomaw, 1983) population scale is a better proxy for *net* agglomeration economies. Since we think that each of these factors captures some of the aspects through which agglomeration might affect wages, we adopt in this paper an agnostic view and measure urban agglomeration with a wide set of variables. First, the LLM employment density, aimed at capturing enhanced-productivity effects induced by agglomeration externalities. Second, the LLM population level, used in the literature to measure the impact of urban amenities.[24] Third, because the latter might manifest themselves only in the largest cities (as it might be necessary to reach a certain critical mass to make the construction of, say, an airport or a specialized school profitable), we control for a large-city dummy (see below). Fourth, we also test the effect of a wide set of threshold dummies (i.e., the 250000, 300000 and 350000 inhabitant-thresholds; the 75th and the 90th-99th percentiles of both the employment density and the population size sample distributions), to increase the robusteness of our results. Finally, we argue that the scope of agglomeration economies might depend on the country's population spatial structure. This argument has been first suggested by Ciccone and Hall (1996), who show that productivity increases with the degree of inequality of the employment density distribution. However, the spatial distribution of the

boundaries requires both that at least three quarters of the LLM residents are employed there and that at least three quarters of the LLM employees reside there.

[23] Note that the US Metropolitan Statistical Areas are not directly comparable to LLMs as they are obtained with a different methodology (i.e., they must contain an urban center and are singled out on the basis of population density as well as commuting conditions).

population might also affect the consumption amenities effect. For instance, it could be the case that in a country like the US, where large cities are surrounded by large portions of very low populated land, the urban amenities effect is more pronounced than in Italy (where the distance between cities is much shorter and almost all land is urbanized to some extent; see Table 1),[25] because the choice between locating in a large city or in its surroundings may be more radical.

We thus analyze the geographical distribution of the Italian population using recently developed techniques of exploratory spatial data analysis (see Anselin (1988) for a review), which detect the existence of a spatial structure by testing the presence of spatial autocorrelation.[26] In particular, we identify significant groupings of the Italian LLM population at the local level wih two complementary tools: the *Moran Scatterplot* and the *Local Moran's I Statistics* (Anselin, 1995 and 1996; see Appendix I for a general description).

3.2 The large-city threshold

The use of the local Moran's *I* statistic in conjunction with the Moran Scatterplot offers an original tool for the identification of the thresholds defining large cities, and it provides, in addition, information on the average population level of their surrounding areas, enabling us to test whether wages are affected by the population spatial distribution as well as by its size. Intuitively, we define a large city as a self-contained labor market with a

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[24] In this vein, Adamson, Clark and Partridge (2004) estimate (log) hourly wages as a function of population size and its square and interpret the former as the favorable urban amenities effect and the latter as a crowding effect.

[25] Table 1 lists the 40 LLMs that fall in the top 5 percent of the population distribution. A comparison between columns (1.2) and (1.3), reporting, respectively, the cumulative population and area size percentages, provides indication of the high degree of urbanization in Italy. Indeed, while in the US 80 percent of the whole population resides in large cities (i.e., SMAs) and less than 2 percent of the territory is paved (Duranton and Puga, 2004), in Italy the same percentage of land is occupied by just the first 4 most populated LLMs, collecting only 18 percent of the total population.

[26] Spatial autocorrelation is *positive* when high or low values of a random variable (e.g., the population level) tend to cluster in space (*spatial clusters*); it is *negative* when geographical areas tend to be surrounded by neighbors with dissimilar values (*spatial outliers*); it is close to *zero* if the observed values are arranged randomly and independently over space (*spatial randomness*). Note that spatial data analysis techniques first

population that is both above the national mean[27] and is also significantly correlated with the population of its surrounding k-LLMs.[28] More precisely, we define large cities as the LLMs in either the HH or in the HL quadrants of the Moran Scatterplot that display a *significant* local Moran's *I* statistic (see Appendix I).[29] In Table 2 we report the outcome, obtained using *k*-nearest neighbors weighting matrices (this choice is motivated and described in Appendix II) with k=5 and k=10 (in Table 2a and Table 2b, respectively).[30] The table shows all the LLMs displaying (up to) 10 percent-level significant values of the local Moran's *I* statistics (second column), with the corresponding position in the Moran Scatterplot (last column). Thus, among all the areas in either the HH or the HL regime (i.e., with a population above the national average) we consider as large cities only those that are associated to a significant statistic (in bold),[31] obtaining a population cut-off point of 404,526 inhabitants. Then, we

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consider population as a random variable and then test the null hypothesis of its spatial randomness (i.e., that is uniformily distributed over the territory).

[27] This choice is consistent with the purpose of this exercise, that is, the identification of the LLMs more likely to be endowed with favorable urban amenities such as airports or specialized schools, which requires a large population mass. The kind of urban agglomeration effects likely to arise in the smaller Italian cities (e.g., in Tuscany or in the North-East of the country) are meant to be captured by our alternative measure of agglomeration, employment density.

[28] Clearly, the *k*-surrounding LLMs are not part of the large city itself, though they are necessary to define which LLM with a population above the national average can be considered as a large city.

[29] To assess the presence of spatial dependence in the distribution of a variable in any partition of the territory a number of alternative statistics can be used. To increase the robustness of our methodology we also employed the *Getis-Ord statistic* (Getis and Ord, 1995). While the local Moran's *I* statistic considers the correlation between the value of a variable in a given area with that of its neighbors, the Getis-Ord statistic is based on the comparison between the average value within a given neighborhood set and the global average. Thus, while both these methods identify the *spatial clusters* (see footnote 25), only the local Moran's *I* statistic allows to detect the *spatial outliers* (i.e., the areas in the high (low) regime surrounded by neighbors with significantly lower (higher) values). Since this is precisely the object of our analysis, we chose to report the results obtained with the local Moran's *I* statistic. The threshold values obtained with the Getis-Ord statistic for the definition of a large city are virtually the same.

[30] Because the local Moran's *I* statistic is based on the comparison between the population level of a given area with the average of its neighbors, using different neighborhood sets with large differences in population size might change the test results. Thus, we also tried k-nearest neighbor weight matrices for any k between 1 and 10 (any choice in the range $k>10$ would not be reasonable in a context of a densely populated country like Italy, where centers of population are located relatively close to each other), with substantially the same results. Indeed, increasing the number of areas in the neighborhood set assigns the same LLMs, with a significant value of the local Moran's *I* statistic, to the HH or HL quadrants of the Moran Scatterplot. Thus, our results are robust to both the statistics used (i.e., local Moran's *I* and Getis-Ord) and the choice of the weighting matrix.

[31] Note that all these areas, corresponding to the first nineteen LLMs listed in Table 1, would be considered large cities in the Italian "common wisdom", with the only exception of Desio. However, this LLM neighboring Milan ranks 17th in terms of population mass and 5th in terms of density. Moreover, none of the LLMs with a population above the national average excluded from the large-city set because of a non-significant local Moran's *I* (i.e., Valentano, Fiuggi, Tuscania and Canazei) would by no means be considered as

distinguish between the large cities surrounded by highly populated labor markets (in the HH regime) from those that are not (in the HL regime). This is a particularly interesting feature of our methodology, because it enables us to test whether the HH and the HL-large cities provide different wage premia (see Section 5.1).

4. Descriptive statistics

In this section we present some descriptive evidence on the largest Italian labor markets, using data on both the LLM universe (above the 95th percentile of the entire population distribution; Table 1) and our sample (above the large city threshold; Tables 3 and 4).

Table 3a compares our sample's wage mean values in large cities to those elsewhere in the country and shows that the former are 5 percent higher than the latter (at the 1 percent level statistical significance), suggesting the existence of an urban wage premium (though quite limited in magnitude).

To investigate on the possible sources of this wage differential, in Table 1 we report the statistics on the skill composition, unemployment rates and small firm concentration of the 5 percent most populated Italian LLMs. In summary, we find that the biggest markets host a large share of college graduates, display higher unemployment rates than the rest of the economy and do not contain industrial clusters of small firms.

In particular, with respect to skill composition, column (1.4) reports the cumulative percentage of the most highly educated people (with at least a bachelor's degree) and shows that roughly one-third of them lives in the first six LLMs (containing one-fifth of the total

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a large city by the Italian "common wisdom". Furthermore, observe that neither choice of the weighting matrix leads to the identification of any significant clustering of areas in the LL regime. In other words, there is no significant local statistic associated to the little populated Italian LLMs (i.e., below average) surrounded by areas with a similarly low level of population. These findings, together with a non-significant value of the global Moran's I statistic (which confirms that, globally, the hypothesis of spatial randomness of the Italian population distribution cannot be rejected), provide further evidence of the spread of the Italian population over the national territory. The standardized (global) Moran's I value is equal to 1.0833 (p-value = 0.2787) and to 1.5290 (p-value=0.1262), using k-nearest neighbors weight matrices with k=5 and k=10 respectively. (Asymptotic) normality is assumed.

population).[32] Also a comparison between Figure 1[33] - representing the spatial distribution of the LLM residing population - and Figure 2 - mapping the share of college graduates in total residents – reveals that in Italy high human capital workers concentrate in the most highly populated LLMs, suggesting that urban wage premia could be due to workers' education composition effects.

With respect to the second point, the figures on unemployment rates in column (1.5) do not appear to be clearly decreasing or increasing along with LLM population level. A visual inspection of Figure 3, mapping the LLM unemployment rate, would seem to confirm the common view that in Italy regional unemployment differentials are more clearly associated to the North-South divide than to a partition based on LLM population size.[34] However, Table 3b reveals that average unemployment rates are roughly 2 percentage points higher in the largest LLMs than in the rest of the country (the two groups of areas appear to be quite homogeneous in terms of unemployment rate dispersion and the difference in mean values is statistically significant at the 1 percent level).[35] This evidence, together with that presented in Table 3a, shows that on average there is a positive association between earnings, unemployment rates and population size, suggesting that in large cities wages might be higher than elsewhere in order to offset the greater risk of unemployment.[36] In contrast, the *wage-curve* literature (see Card, 1995) finds a negative correlation between (log) wages and local unemployment (note that next section's econometric results indicate that this is indeed the case once we control for individuals' observable characteristics and area fixed effects).

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[32] A similar result is found by Glaeser (1999) for the US.

[33] The maps in Figures 1, 2 and 3 aggregate LLMs in homogeneous groups by minimizing the sum of the variance within each class, enabling us to visualize groupings and patterns inherent to the spatial structure of the data.

[34] Note that the LLM distribution by residing population is quite independent from geographical location (see Table 1's last column).

[35] Large cities seem to be characterized by higher unemployment rates also in the Italian Labor Force Survey data (see Di Addario, 2005).

[36] According to the *compensating wage differential hypothesis*, in specialized cities wages are higher in order to compensate individuals from a greater unemployment risk (see Diamond and Simon, 1990).

Finally, the figures of Table 1 indicate that in Italy urbanization and localization effects are quite distinct phenomena when the latter is measured with the presence of Industrial Districts, which are the most common form of Italian industrial agglomeration.[37] Indeed, column (1.6) shows that no Industrial District is within the ten most populated LLMs, and only four can be classified as a large city (namely, Padua, Desio, Bergamo and Como).

Table 4 presents the entire set of descriptive statistics from our sample, which comprises all the wage-earners from a primary activity, for a total of 22,996 individuals distributed over 242 LLMs (30 percent of the total). Our sample includes all the 19 Italian large cities (see previous section), comprising a total of 6,796 employees.

As expected, large cities contain more office workers, worker supervisors, and real estate employees than the rest of the economy. Furthermore, large-city workers are slightly older and experienced than those living elsewhere, again supporting the hypothesis that urban wage premia might be explained by the presence of higher human capital. Indeed, in line with Table 1's evidence (based on the entire country), also our sample indicates that the employees who reside in the largest markets tend to be more educated than elsewhere: the difference in the mean values between the share of college graduates in the largest LLMs and that in the rest of the country is 27 percent and is statistically significant at the 1 percent level (Table 3c). In the next section we will obtain some indication on whether the most educated people prefer living in large cities because of the consumption amenities these offer or because of higher returns.

[37] Industrial Districts are spatially concentrated clusters of small and medium sized firms specialized in one or few stages of a main manufacturing production (for a more detailed description see de Blasio and Di Addario, 2005). Of course, we are not ruling out the possibility that urbanization is correlated with the localization of large firms.

5. The estimation results

In Section 5.1 we examine whether the prior of higher average wages in urban areas holds true after controlling for individual and LLM characteristics by estimating a log-linear Mincerian function augmented with the agglomeration variables:

$$\log w_i = \alpha_0 + \alpha_1 EDU_i + \alpha_2 EXP_i + \alpha_3 EXP_i^2 + \alpha_4 TEN_i + \alpha_5 TEN_i^2 + \alpha_6 CITY_i + Z_i \beta + u_i \,,$$

The dependent variable of our earnings function is the logarithm of employees' hourly wage rates from primary activities, deflated with the consumer price index for blue-collar worker and employee households,[38] which is the inflation indicator used in national contracts. In addition to the standard Mincerian variables (experience, tenure, and education) we also control for the vector *Z*, including individual characteristics (e.g., sex and marital status), job qualification, some features of the worker's firm (e.g., firm size, industry dummies, type of contract, like, for instance, Adamson, Clark and Partridge, 2004), the unemployment rate of LLM of residence (as in the "wage-curve" literature)[39] and year dummies; u is the error term.

We capture the urban effect with mainly three alternative variables: LLM employment density, LLM population mass and a dummy variable equal to one if the worker resides in a LLM with more than 404,526 inhabitants (see Section 3). Moreover, since the large city dummy and the LLM employment density are not highly correlated (the correlation coefficient is 0.6), we are also able to test their joint effect. This is a particularly interesting feature of our dataset, as it enables us to separate the contribution supplied by areas' population size, which proxies desirable urban amenity effects (since the provision of goods such as airports, specialized schools, operas, ethnic restaurants, etc. might require a certain critical population mass), from that provided by areas' employment density, which is a better

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[38] Wages are net of taxes, social security contributions, and fringe benefits, but include overtime work, any additional monthly salary (e.g., "13th month" salary), bonuses and special emoluments. The CPI, based in the year 1995, is net of tobacco and gross of indirect tax variations.

[39] Note that if labor was perfectly mobile across LLMs and sectors, local unemployment rates, industry and firm characteristics should not influence wages. However, in Italy labor mobility is rather low, and as a matter

proxy for agglomeration-enhanced productivity effects. Since consumption amenities tend to depress wages, we expect the effect of city size to be negative or at least lower than that of employment density.

Moreover, we test the existence of threshold effects beyond the 75th and the 90th-99th percentiles of both the employment density and the population size sample distributions, and also those beyond the 250000, 300000 and 350000 inhabitant-thresholds. In Section 5.1.1 we tackle the endogeneity issues by undertaking a number of robustness check (e.g., controlling for regional fixed effects and ability, instrumenting education, etc).

In Section 5.2 we study whether larger markets exhibit a different wage structure. We thus estimate a version of the previous earnings functions where we add the interactions between all the regressors and the agglomeration variables, to calculate, in particular, the urbanization differentials in the returns to education, experience and tenure.

5.1 Urban wage premia

Table 5 reports the outcome of the ordinary least square estimates. We test four specifications for each of the agglomeration variables considered: the LLM population mass (columns (5.1)-(5.4)), the LLM employment density (columns (5.5)-(5.8)), and the large city dummy (columns (5.9)-(5.12)); in columns (5.13)-(5.16) we estimate the joint effect of these last two variables. Thus, the vector of control variables in columns (5.1), (5.5), (5.9) and (5.13) includes the standard individuals' observable characteristics (i.e., education, second-order effects of experience and tenure, sex, marital status, the macro-region of residence[40]) and the LLM unemployment rate.[41] Then, we gradually introduce firm characteristics and job qualification, and in columns (5.2), (5.6), (5.10) and (5.14) we also control for the sector

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of fact these variables are commonly found to be important determinant of wages in the international empirical literature.

[40] That is, dummies for North and South, intended to capture the amenities associated to the region rather than to the city.

[41] After testing higher order polynomials of local unemployment rate, Blanchflower and Oswald (Blanchflower, David G. and Andrew J. Oswald. 1994. *The Wage Curve*. Cambridge, Massachussets and London: MIT Press; cited in Card, 1995) conclude that a linear term approximates well the unemployment-wage relation.

and the size of the worker's firm[42] and for the type of work contract (full-time versus part-time), while in the third, seventh, eleventh and fifteenth specifications we add the worker's job status.[43] Finally, we relax the constraint of linearity between the logarithm of wages and education splitting the years of education into three dummies: middle school attainment, secondary school education and university degree or above (columns (5.4), (5.8), (5.12) and (5.16)).

Since our territorial unit of analysis is the LLM, all our regressions are standard error-adjusted for within-labor market correlation.[44] As evident from Table 5, all the Mincerian variables are always highly significant (at the 1 percent level) and their effect is invariant to changes in the agglomeration proxy used. Thus, unless explicitly stated, from now on we will refer to specifications (5.3), (5.7), (5.11) and (5.15), which we take as our benchmark.

In line with the predictions of the human capital literature, the earnings function is concave both in experience and firm tenure. More specifically, while a marginal increase in general human capital (at the mean) raises wages by about 5 percent, a marginal increase in firm-specific capital raises earnings by 4 percent. Similarly to other results on Italy, an extra year of education increases wages by 2 percent.[45] However, when we split years of schooling into the three education dummies, we find that only the workers with a high-school diploma and college graduates or post-graduates earn a significantly higher wage than those with primary education or no qualification (the differentials are, respectively, 10 and 27 percent large; columns (5.4), (5.8), (5.12) and (5.16)), while the individuals with a middle school

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[42] More specifically, we adopt the finest breakdown available in the SHIW: manufacturing; building and construction; wholesale and retail trade, repair of motor vehicles; transport, warehouse, storage and communication services; credit and insurance services; real estate and renting services, IT services, research, other professional and business activities; and public sector (general government, defence, education, health and other public services). The benchmark is thus the agricultural sector (plus domestic services provided to households). To control for firm size we use a dummy equal to one if the worker's company has less than 100 employees.

[43] The breakdown available for job status is the following: office worker; school teacher; worker supervisor or junior manager; manager, senior official, principal, headmaster, university professor, magistrate. Our benchmark is blue-collar workers (including apprentices and home-workers).

[44] Since our 22,996 observations are distributed over 230 LLMs in four time periods we have enough degrees of freedom for our estimations (see Card, 2001).

[45] Psacharopoulos (1994), for instance, examines returns to education for a large number of countries and obtains a 2.3 percent estimate for Italy.

attainment do not.[46] The job qualification dummies are always significant: office workers earn 11-14 percent more than blue-collar workers, while worker supervisors and managers, respectively, 25 and 47 percent more. All sectors display higher wages than the agricultural one, but the largest premium (21-23 percent) accrues to the credit and insurance service sectors. Controlling for individuals' work status, eliminates any public-private sector wage differential, in line with Dell'Aringa, Lucifora and Origo (1995).[47] As expected, we find significantly negative female-male and small-large firm wage gaps (about 10 percent large the former and 13 percent the latter). Consistently with the findings of the wage-curve literature, the individuals residing in LLMs with higher unemployment rates earn significantly less (–0.4 percent).[48] Interestingly, while working in the North gives a 2-3 percent premium with respect to the Center, controlling for the level of urbanization eliminates the negative South differential almost completely.

In relation to the objective of this study, we always find evidence of the existence of an average urban wage premium, though very small in size. Thus, an increase of 100 LLM employees per square kilometer raises earnings by 0.4-0.6 percent, and every additional 100,000 inhabitants in the LLM provides workers with 0.1 percent higher wages (in line with Diamond's and Simon's (1990) results for the US).[49] The magnitude of these two effects is of a comparable size, as the responsiveness of wages to changes in employment density or population size in terms of standard deviation is virtually the same. Indeed, one standard deviation increase in employment density raises (log) wages by 4.9 percent of their standard deviation, whereas one standard deviation rise in the level of population increases (log) earnings by 5.1 percent of their standard deviation. Furthermore, working in a LLM

[46] This is not surprising in the light of the fact that middle school has been the level of compulsory education for about 35 years (from the 1962 *Mandatory Middle School Reform* to 1999).

[47] The authors find that the public-private sector wage gap is largely explained by local labor market conditions, which, anyhow, affect above all the private sector.

[48] The elasticity of wages with respect to local unemployment rate is about -0.04, half the size of that found by Blanchflower and Oswald using annual earnings for the U.K. (Card, 1995). Note that Glaeser and Maré (2001) do not control for area's unemployment rates. If we omit this variable from our regressions the urban wage premium remains statistically significant but lowers in all specifications. This is because in the Italian largest cities unemployment rates are higher than in the rest of the economy (see previous section). Thus, including unemployment rates is important especially in countries like Italy, where labor mobility is slow.

with more than 400,000 inhabitants provides employees with a 2-3 percent higher wage (columns (5.9)-(5.12)).

The existence of an urban wage premium, even if small in magnitude, necessarily implies that in Italy the combined positive effect of agglomeration-induced productivity gains, poaching diseconomies and people's distaste for urban disamenities (e.g., higher house rents and prices)[50] prevails over the negative impact of workers' preferences for large-city amenities. In order to disentangle the effect of these factors we run another set of regressions controlling for both LLM employment density and the large city dummy (columns (5.13)-(5.16)), under the hypothesis that the former proxies labor productivity, while the latter urban amenities (i.e., the provision of airports, specialized schools, operas, ethnic restaurants, etc.). We find that employment density provides a 0.3-0.5 percent premium while the large city dummy loses significance, implying that once agglomeration-induced productivity gains are controlled for, the preferences for consumption amenities are not strong enough to affect wages. This finding is also confirmed when we substitute employment density with LLM population density,[51] even though the latter provides a lower premium (0.1-0.2 percent).

For completeness, we also test the impact of dummy variables defined both on arbitrary cut-off points (i.e., LLM with at least 200,000, 250,000, and 300,000 inhabitants) and on the basis of the 75th, 90th-99th percentiles of the LLM employment density and population size sample distributions. Table 6 reports the results for the 75th, 90th, 95th and 99th percentiles[52] (the others are available upon request) of our benchmark specification,

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49 Measuring these effects in logarithms provides an elasticity of wages both with respect to employment density and with respect to population mass of 0.01. Thus, worker *i*'s wage is 0.7 percent higher than worker *j*'s if the employment density or population size of his residing LLM is double the size of *j*'s.

50 Similarly to Adamson, Clark and Partridge (2004), we do not control for LLM house prices and rents precisely because we are interested in the *net* effect of all these factors on wages.

51 This variable, while being a worse proxy of labor productivity than LLM employment density, captures the negative externalities exercised by the population as a whole (e.g., higher housing prices, more intense traffic jams, pollution, etc.) rather than by the employees on each other. Results are available upon request.

52 The 99th percentile of the population distribution (2,460,534 inhabitants) includes the three largest LLMs (Rome, Milan and Naples); the 95th percentile (604,009 inhabitants) adds Venice, Catania, Bologna, Genova, Palermo, Florence, Bari and Turin; while the 90th percentile (Caserta) and the 75th (Gallarate) contain, respectively, 382,734 and 190,659 inhabitants. The 200,000-inhabitant threshold corresponds to the LLM of Treviglio, the 250,000-inhabitant threshold to Trieste, and the 300,000-inhabitant threshold to Udine (the

showing the presence of a significant wage premium for any threshold value we tested. While agglomeration externalities do not exhibit any specific pattern with respect to LLM population size (columns (6.1)-(6.4)), they monotonically increase with employment density (columns (6.6)-(6.9)), with a premium raising from 1.6 percent in the 75th percentile of the distribution to 4.6 percent in the three densest LLMs (Milan, Desio and Naples). However, when we add LLM population size or employment density all the threshold dummies used lose significance (results available if requested), implying that the urbanization-wage curve is indeed log-linear. This finding is also confirmed by the fact that when we lift the imposition of linearity between (log) earnings and the urbanization variables, and we test higher order polynomials (with quadratic and cubic terms) of both population and employment density, these are never significant (results are not reported due to space constraints).

Finally, we test the hypothesis that the scope of agglomeration economies depends on population spatial structure by distinguishing between the large cities surrounded by highly populated labor markets (HH) from those that are not (HL; see Section 3). Column (6.5), reporting the results corresponding to the benchmark specification ((5.11)), shows that only the estimated coefficient for large cities of the HL type is statistically significant, with an estimated 2 percent wage premium. This finding supports the hypothesis that agglomeration economies or consumption amenity effects manifest themselves only when there is a sufficiently large difference between large cities and their surroundings, confirming that the spatial distribution of LLM population is an important determinant of urbanization externalities.[53]

resultant wage premia are, respectively, 2.1, 1.4, and 1.7 percent large). Finally, The 99th, 95th, 90th, and 75th percentiles of the employment density distribution correspond, respectively, to: 0.87, 0.43, 0.30 and 0.16 employees per LLM square kilometer.

[53] In order to test for the presence of residual spatial autocorrelation, which could potentially bias our estimation results, we also estimated LLMs' fixed effects and performed a Moran's *I* test on the obtained series. The results (available upon request) provide no evidence on the presence of unobserved spatial effects in all the model specifications.

5.1.1 Robustness checks

Urban wage premia may be affected by individuals' unobservable characteristics correlated with both the agglomeration variables and wages. For instance, large cities may exhibit higher average wages because they attract the most able workers (e.g., because, by being more productive and thus earning more, they might be better capable of affording the higher rents due to congestion). If this were the case, the OLS estimates of urban agglomeration would be biased upwards. However, it is also possible that large cities attract the least able workers, because of their stronger informal labor market (e.g., illegal activities) drawing in 'bad type' job seekers, or because of the availability of a larger offer of vacancies (e.g., from a more generous government support), creating an additional demand for the less productive matches. If city size was in fact negatively correlated with ability, our OLS agglomeration effect estimates would be biased downwards. Thus, the sign of the bias (provided it existed) is ultimately a matter of empirical estimation.

A possible method to separate agglomeration effects from the impact of self-selection into large cities is the estimation of a balanced panel where the area-fixed effects are identified by the individuals who change LLM of residence over time (the "movers") and those who do not (the "stayers"; see, for instance, Combes, Duranton and Gobillon, 2003). An alternative method consists in testing whether the movers into a larger city receive a wage premium and whether the movers into a smaller town bear a wage loss (see Glaeser and Maré, 2001). However, none of these methods can be carried out in this paper, as our sample does not contain movers (i.e., none of the individuals interviewed by the SHIW changed LLM of residence in the period 1995-2002). This is not too surprising, as our territorial units of analysis are the self-contained LLMs (see Section 3). Moreover, endogeneity issues are typically not a major concern in a country like Italy, where labor mobility is particularly low in levels and has been decreasing over time (Cannari, Nucci, and Sestito, 2000) and where people's residential choices are conditioned to a large extent by the location of their family, while being affected by the heavy imperfections of the housing market (see Di Addario (2005) for a more complete discussion on these issues).

Nevertheless, we are able to undertake a couple of sensitivity checks.

First, on the sub-sample of the employees with at least a secondary school attainment who have been interviewed in 2000 or 2002, we can include two proxies for ability among the regressors: the final mark and a dummy for *laude*.[54] Since the smaller sample size (5,314 observations) and the characteristics of the individuals sampled may create a self-selection problem, we run the regressions both without and with ability (respectively, columns (7.5)-(7.8) and (7.9)-(7.12)). We find that indeed there is a selection problem, as in this sub-sample all urbanization effects disappear. This result suggests that the most highly educated employees do not benefit from agglomeration externalities, in line with next section's findings, where we analyze more thoroughly whether the gains from urbanization vary with educational attainment. When we add the two ability proxies we find that the only factor having a positive impact on wages is having graduated with a laude, while the mark obtained does not make any difference. Nevertheless, including ability does not change the results on agglomeration, supporting the view that omitting ability should not cause serious endogeneity problems in our urbanization variables.

Second, we test whether our results could in fact be driven by area-specificities different from urbanization by controlling for regional fixed effects.[55] Table 8 shows the main results for our benchmark specification.[56] The urban wage premium arising from employment density is now slightly lower (0.3 against 0.4 percent), while that accruing to large cities is a little higher (2.3 against 2 percent). However, when we control for both the large city dummy and the LLM employment density (column (8.4)), we find that the former provides a 3 percent premium while the latter becomes non-significant, reverting Table 5's result. To test whether this finding could in fact be driven by the North-South divide, we run two separate regressions on the Center-North and the on South sub-samples. Indeed, columns (8.5)-(8.8) and columns (8.9)-(8.12) seem to reflect the presence of different

[54] Unfortunately, this is the only sample on which we have information on the final mark obtained (for college graduates we also know whether they received a laude).

[55] Since LLMs are more disaggregated than Regions, we are able to control for 19 regional fixed effects (Piedmont is the omitted Region). In the previous regressions we were just controlling for the macro-area of residence (North and South).

[56] In this paper we report only the results on the relevant variables; for a complete version of Tables 7-9, see Di Addario and Patacchini (2005).

agglomeration-externality mechanisms:[57] population size generates higher premia in the South than elsewhere, while employment density has a positive impact on wages only in the Center-North. The former result may be due to the fact that Southerners have weaker preferences for living in large cities than Northerners, possibly because the Southern large cities are less endowed with the desirable amenities depressing wages than the Northern ones. The latter result is not too surprising in the light of the fact that labor productivity is typically lower in the South of the country and that employment density proxies productivity-enhancing agglomeration effects. It is thus possible that the current productivity level in South is far too low for agglomeration economies to generate any amplifying effect; alternatively, there might be unobservable characteristics (e.g., the mafia, high levels of criminality, etc.) preventing Marshallian externalities from taking place.

Summarizing, we can conclude that after controlling for endogeneity issues workers of given individual characteristics tend to earn more, on average, in the largest local labor markets. We have shown that this result is not just due to skill composition effects (e.g., the greater presence of college graduates in large cities emerged in the descriptive statistics), since we still find evidence of an urban wage premium after controlling for both education and work status. Finally, we can also disregard the hypothesis that large-city wage differentials are a compensation for a greater unemployment risk, since once we control for individuals' observable characteristics the effect of local unemployment rates on earnings becomes negative.

5.2 The urban wage structure

In this section we analyze whether urbanization affects the structure of wages. Indeed, agglomeration effects may not be skill-neutral, unevenly affecting the wages of workers with different characteristics. In particular, we are interested in examining whether returns to

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[57] A different wage sensitivity to urbanization in the two macro-areas could be due to several factors: the large productivity differentials, generating a disparity in the scope of agglomeration externalities; cultural differences, affecting individuals' evaluation of urban amenities and disamenities; a structural diversity in cities' characteristics (i.e., the ones in the South being less efficient, less endowed with cultural events and infrastructures, more subject to high criminal rates, etc. than those in the North).

education, experience, and tenure vary with LLM population level, LLM employment density or between the largest cities and the rest of the country.

The descriptive statistics presented in Section 4 indicate that large cities attract (or produce) the most experienced and educated workers. This phenomenon could possibly be due to returns to experience and education increasing with urban scale, but also to the most skilled people having a relatively stronger preference for large-city amenities than low skilled workers. In the former case we should observe higher urban return-to-education and/or to experience differentials, in the latter case, the reverse.

The findings of Table 7 (columns (7.1)-(7.8)) seem to suggest that returns to education do not increase with urbanization. In specifications (7.9)-(7.12), we test the exogeneity of our education variable with a two-step instrumental variable methodology,[58] instrumenting the individuals' years of schooling with their father's and mother's age, years of education and work status. Even though these instruments are probably not ideal, as their validity relies on the assumption that parents' family background is unrelated to offsprings' wages (which cannot be tested), they are certainly highly correlated to the individual's educational attainment (the F-test always rejects the null hypothesis that all the instruments' coefficients in the first step equation are zero at the 1 pecent significance level). Moreover, when we incorporate the residuals of the first step regression obtained with these instruments into our Mincerian wage functions we can never reject the hypothesis that their estimated coefficient is equal to zero in any of the specifications tested, implying that education is not endogenous. Nevertheless, we also report the outcome of the regressions where years of education was instrumented with family background (Table 7). Columns (7.9)–(7.12) show the instrumental variable estimate results corresponding to our benchmark specifications. The number of observations drops to 19,310 because not all individuals gave information on

[58] In the first step, years of schooling is estimated as a function of both the (exogenous) regressors of the original wage equation and the instruments. In the second step, the residuals from this regression are added to the set of explanatory variables in the Mincerian wage function. If the null hypothesis that the coefficient of these residuals is equal to zero cannot be rejected, education can be considered exogenous (see Wooldridge, 2002, p. 90-92).

their parents' background,[59] but the agglomeration estimates maintain a similar sign, magnitude and significance level to those in Table 5, confirming that the possible endogenous sorting of workers into cities is not a major concern in our analysis.

Table 9 shows the key results corresponding to a version of Table 5 augmented with the interactions between all the regressors and, alternatively, LLM population size (columns (9.1)-(9.4)), LLM employment density (columns (9.5)-(9.8)), the large city dummy (columns (9.9)-(9.12)), and the interaction between these last two variables (columns (9.13)-(9.16)). Thus, for instance, the coefficient of the interaction between the large-city dummy and the college graduate dummy (column (9.12)) represents the large-city return to bachelor's degree differential with respect to the rest of the economy, while, more generally, the coefficient of the interaction with population size tells whether returns to university degree vary with urban scale (column (9.4)). Since the robustness checks presented in Tables 7 and 8 do not show signs of endogeneity in either our agglomeration or education variables, we will report only the results of the OLS estimations.[60]

We find that urban agglomeration does not generate monetary incentives to invest in human capital accumulation, neither in general nor on-the-job. Indeed, the urbanization differentials in the returns to experience are virtually zero,[61] while those in the return to tenure in current firm are negative (columns (9.1)-(9.8)). In particular, a marginal increase in LLM employment density (or a 100,000-inhabitant increase in LLM population size) reduces returns to seniority by 0.1 percent. This finding is consistent with the view according to which tenure is negatively correlated to the efficiency of the worker-firm match (as high

[59] To increase the number of observations we also did the same exercise using only father's background as instruments. The number of observations raises to 20,692 but results are qualitatively the same.

[60] Moreover, IV estimates are not without problems. Not only they are sensitive to the choice of the instruments, but even when "based on ideal instruments (observable factors that are by assumption *independent* of individual abilities) [they] will typically recover a weighted average of returns to education for people whose education choices were affected by the instrument, rather than the average marginal return to education in the population" (Card (2001), p. 1157). Finally, there is no agreement on the sign of OLS estimates' bias. While a number of studies finds a positive bias (see Card (2001) for a review), on the basis of 1985-1995 data on 28 worldwide countries, Trostel, Walker and Woolley (2002) find that the OLS return-to-education coefficients are downward biased with respect to IV estimates.

[61] A marginal increase in experience (at the mean) determines a mere 0.01 percent higher growth in worker *j*'s earnings than in worker *k*'s, if *j* resides in a LLM with 1 million more inhabitants than *k*'s. The differential

quality workers tend to change job more frequently, Stevens, 2003) and positively related to agglomeration.

On average, we find a weak evidence of negative return-to-education differentials in the largest labor markets. Indeed, the interaction between years of schooling and our agglomeration variables provides a significant estimate only when we measure urbanization with LLM population size (column (9.3)). However, when we release the imposition of a linear relationship between wages and education, we find that returns to bachelor's degree are systematically negatively correlated with all our agglomeration variables, while returns to lower attainment are not affected by location.[62] In particular, returns to bachelor's degree decrease with urban scale: a 100,000-inhabitant increase in LLM population size lowers college graduates' wages by 0.3 percent (column (9.4)), while living in a large city entails a 7 percent reduction (column (9.12)). Furthermore, a college graduate employed in LLM *j*, with 100 employees per square kilometer more than LLM *k*'s, earns 0.9 percent less than a similar worker in *k*, while *j*'s employees lose 0.1 percent of their earnings with respect to *k*'s for every extra year of tenure in their current firm (column (9.8)). This outcome is in line both with Adamson, Clark and Partridge (2004), who find that doubling the population in the US SMA population lowers returns to university degree by 2 percentage points (3 percent in the eight largest cities), and with Black, Kolesnikova and Taylor (2005), who show that the US high-amenity cities (i.e., San Francisco, New York and Seattle) exhibit lower returns to university degree than the low-amenity ones (e.g., Houston, Pittsburgh). These results suggest that both in Italy and in the US the skill-biased urban amenity effect dominates the skill-biased agglomeration one.[63] Indeed, since the most highly educated workers have a stronger preference for living in large cities than for living elsewhere (Table 3c) in spite of

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increase in returns to experience is slightly higher – though less significant - when we measure urbanization with employment density.

[62] In this respect, urban and industrial agglomeration effects are rather similar in Italy. Indeed, de Blasio and Di Addario (2005) show that the zero average premium in Industrial Districts reflects higher returns to education for the workers with an elementary attainment or less with respect to similarly qualified workers outside, and lower returns for the more educated employees.

[63] Note that with the term "skill" we strictly refer to schooling attainment, as in contrast to returns to education, returns to job qualification increase with urban scale. Thus, urbanization "rewards" job qualification and penalizes education.

earning lower wages, there must be urban consumption amenities that compensate their income loss.[64]

In contrast to the previous results (but not with other results of the literature),[65] we find that returns to job qualification increase with urban scale. Thus, office workers' and worker supervisors' earn, respectively, an extra 0.1 and 0.5 percent more for every additional 100,000 inhabitants in their LLM (beyond the 400,000-inhabitant threshold these differentials raise to 3 and 13 percent, respectively, columns (9.9)-(9.12)). Moreover, as it is evident from specifications (9.15)-(9.16), a 100-employee-per-square-kilometer increase raises only the earnings of managers (by 1.8-2.1 percent), while living in a large city affects just worker supervisors' wages (8-9 percent higher than elsewhere). These results suggest that in Italy urbanization remunerates more job qualification than educational attainment.

Finally, we find that LLM population size and employment density raise earnings in the public sector and in the real estate and IT service sectors, while further depressing women's wages.

6. Concluding remarks

This paper has analysed the impact of urban agglomeration on average wages and the structure of earnings in Italy.

Using alternative measures of agglomeration, we find evidence of an urban wage premium, though very small in size. The large-city wage premium is just 2-3 percent wide, which, according to Glaeser's and Maré's (2001) findings is more than 20 percentage points lower than in the US. The large difference between the two countries could be explained either by the fact that Italians have stronger preferences for large-city amenities (or a weaker

[64] We cannot directly test whether college graduates benefit more than less educated workers from urban productivity gains, but our results say that even if this was the case, the enhanced productivity effect is more than offset by the negative impact on wages deriving from skill-biased urban amenities.

[65] Also Rosenthal and Strange (2005) find differentials in the returns to job qualification: for every additional 10,000 college graduate workers within 5 miles, lawyers and scientists earn, respectively, a 12.8 and a 4.5 percent premium, while engineers' and mechanics' wages are not affected.

distaste for urban congestion) than Americans,[66] or by the fact that the productivity gains generated by agglomeration economies are larger in the US than in Italy. There are mainly two reasons for why this should be the case. First, because the longer history of wage flexibility in the US gave agglomeration externalities more time to develop.[67] Indeed, reforms aimed at increasing the response of wages to productivity and market conditions (e.g., unemployment levels) have been introduced only very recently in Italy.[68] Before 1990s wages were rigid and had little scope to vary locally, because the bargaining system was very centralized. Only in 1993 were reforms introduced to increase the degree of firm-level bargaining and to reduce the gap between the public and the private sector wage setting (Dell'Aringa, Lucifora and Origo, 1995). Second, productivity gains generated by agglomeration economies might be greater in the US because of a higher degree of inequality in the spatial distribution of the population. In this paper we argued that the magnitude of agglomeration externalities depends on the level of differentiation between the agglomeration characteristics (i.e., size or density of the city's population or employment) of the area in question and those of its neighboring zones, which is usually taken not to matter by the literature. This hypothesis is supported by our results. Indeed, the absence of any threshold effect beyond the various cut-off points tested (neither in terms of size nor in terms of density), together with the finding that wage premia exist only in the large cities that are surrounded by particularly low-populated areas might imply that the earning differentials due to agglomeration are lower than in the US simply because in Italy large cities are less

[66] Preferences might be different for cultural, historical or even architectural reasons (Italians consider living in the center of cities more prestigious, while Americans prefer the suburbs), or because of differences in the availability of non-monetary benefits (e.g., more job posting by firms). In Italy, for instance, urbanization increases job seekers' chances of finding employment per unit of search (Di Addario, 2005) - but we do not know of any similar study based on US data to be able to make a comparison.

[67] See Rosenthal and Strange (2004) for a review on the temporal scope of agglomeration economies. However, while this literature usually refers to the dynamics of agglomeration economies (e.g., learning takes time to develop and then decays), here we are referring to a sort of structural break induced by the removal of institutional constraints (i.e., a fully centralized wage setting), lessening wage sensitivity to agglomeration externalities.

[68] Although this hypothesis does not seem to be supported by our data. Indeed, if the agglomeration effect depended on the timing of reforms we would expect its magnitude to increase over time. However, when we split the impact of urbanization into the four periods of our sample, the interactions between the year dummies and the urbanization variables do not show any specific upward time-trend (results available upon request). Since our sample may be too short to observe any trend, it would thus be interesting to study the development of agglomeration economies over a longer period of time. The Italian case would be an ideal setting to study this issue as wages have been rather rigid until 1990s.

differentiated from their environing areas. This suggests that more research is probably needed on the relationship between agglomeration economies and the population spatial distribution.

Finally, we have shown that the nearly non-existence of large-city wage premia hides substantially different losses and gains for different categories of workers that cancel out in a sort of zero-sum game. Indeed, we find that urbanization increases the monetary returns of managers, worker supervisors and office workers, does not affect returns to overall experience in the labor market, and reduces the returns to education and to tenure with current firm. In particular, college graduates living in a large city are subject to a 7 percent wage reduction. This apparent paradox can be explained in a quality-of-life framework. Indeed, even if we cannot test whether the more educated employees benefit more than less educated workers from urban productivity gains, our results say that even if this was the case, the enhanced productivity effect is more than offset by the negative impact on wages deriving from education-biased urban amenities.

Tables and figures

Table 1

CHARACTERISTICS OF ITALIAN URBAN AREAS

	Area	Population (%)	Land (%)	College graduates (%)	Unemployment rate	Industrial District	Location
	(1.1)	(1.2)	(1.3)	(1.4)	(1.5)	(1.6)	(1.7)
1	Roma	0.06	0.01	0.12	0.09	No	Centre
2	Milano	0.11	0.02	0.20	0.06	No	North
3	Napoli	0.15	0.02	0.24	0.23	No	South
4	Torino	0.18	0.02	0.28	0.09	No	North
5	Bari	0.20	0.03	0.30	0.11	No	South
6	Firenze	0.21	0.04	0.32	0.09	No	Centre
7	Palermo	0.23	0.05	0.34	0.17	No	South
8	Genova	0.24	0.05	0.36	0.10	No	North
9	Bologna	0.25	0.05	0.38	0.05	No	North
10	Catania	0.26	0.06	0.40	0.16	No	South
11	Venezia	0.27	0.06	0.41	0.07	No	North
12	Padova	0.28	0.06	0.42	0.05	Yes	North
13	Desio	0.29	0.06	0.42	0.07	Yes	North
14	Taranto	0.30	0.07	0.43	0.19	No	South
15	Verona	0.31	0.07	0.44	0.06	No	North
16	Bergamo	0.32	0.07	0.45	0.04	Yes	North
17	Cagliari	0.32	0.08	0.46	0.19	No	Centre
18	Como	0.33	0.08	0.46	0.04	Yes	North
19	Lecce	0.34	0.09	0.47	0.20	No	North
20	Brescia	0.34	0.09	0.48	0.05	Yes	North
21	Caserta	0.35	0.09	0.48	0.16	No	South
22	Brindisi	0.36	0.10	0.49	0.12	No	South
23	Busto Arsizio	0.36	0.10	0.49	0.09	Yes	North
24	Udine	0.37	0.10	0.50	0.06	Yes	North
25	Lecco	0.38	0.11	0.50	0.03	Yes	North
26	Salerno	0.38	0.11	0.51	0.16	No	South
27	Frosinone	0.38	0.11	0.51	0.09	No	Centre
28	Reggio Emilia	0.39	0.11	0.52	0.04	Yes	North
29	Messina	0.39	0.12	0.53	0.18	No	South
30	Siracusa	0.40	0.12	0.53	0.16	No	South
31	Parma	0.40	0.12	0.54	0.05	Yes	North
32	Varese	0.41	0.12	0.54	0.06	Yes	North
33	Treviso	0.41	0.12	0.55	0.03	Yes	North
34	Pescara	0.42	0.13	0.55	0.11	No	Centre
35	Trieste	0.42	0.13	0.56	0.08	No	North
36	Prato	0.43	0.13	0.56	0.08	Yes	Centre
37	Modena	0.43	0.13	0.57	0.05	Yes	North
38	Aversa	0.43	0.13	0.57	0.29	No	South
39	Vicenza	0.44	0.13	0.57	0.04	Yes	North
40	Cosenza	0.44	0.14	0.58	0.20	No	South

Source: Labour Force Survey.

Notes: Data are reported to the universe. The LLMs are ordered according to decreasing population size.

Table 2

MEASURES OF LOCAL SPATIAL CORRELATION

2a : k = 5

LLM	LISA	p-value	Spatial regime
Milano	15.8706	0.0000	HH
Bergamo	13.2544	0.0000	HH
Como	12.0724	0.0000	HH
Bari	5.5128	0.0000	HH
Venezia	4.0667	0.0000	HH
Napoli	-8.3513	0.0000	HL
Roma	-6.9295	0.0000	HL
Genova	-5.1671	0.0000	HL
Torino	-3.8038	0.0001	HL
Firenze	-2.6175	0.0089	HL
Valentano	-2.3233	0.0202	LH
Fiuggi	-2.1059	0.0352	LH
Palermo	-2.0452	0.0408	HL
Desio	2.333	0.0420	HH
Tuscania	-2.0011	0.0454	LH
Verona	2.0001	0.0454	HH
Cagliari	-1.7089	0.0874	HL
Catania	-1.6701	0.0949	HL
Taranto	-1.6701	0.0949	HL
Padova	-1.6701	0.0949	HL
Bologna	-1.6561	0.0976	HL
Lecce	-1.6488	0.0992	HL

2b: k = 10

Area	LISA	p-value	Spatial regime
Milano	26.9516	0.0000	HH
Bergamo	11.5786	0.0000	HH
Como	9.8708	0.0000	HH
Bari	5.6971	0.0000	HH
Venezia	4.6005	0.0000	HH
Napoli	-6.8583	0.0000	HL
Torino	-5.8636	0.0000	HL
Roma	-3.5889	0.0003	HL
Palermo	-2.6998	0.0069	HL
Genova	-2.6670	0.0077	HL
Firenze	-2.6557	0.0079	HL
Padova	-2.2000	0.0278	HL
Bologna	-1.9195	0.0549	HL
Cagliari	-1.9092	0.0562	HL
Lecce	-1.8989	0.0576	HL
Canazei	-1.8831	0.0597	LH
Catania	-1.8719	0.0612	HL
Taranto	-1.8377	0.0660	HL
Verona	1.8289	0.0674	HH
Desio	1.8221	0.0684	HH
Valentano	-1.7929	0.0730	LH

Source: Labour Force Survey.
Notes: The LLMs are ordered according to decreasing significance levels. "Large cities" are in bold. LISA (Local Indicators of Spatial Association) stands for local Moran's *I* statistic.

Table 3

WAGES, COLLEGE GRADUATES AND UNEMPLOYMENT

3a: Wages *(euro per hour)*

	Obs.	Mean	St. dev.	Min	max
Large cities	6,796	6.909	5.657	0.272	318.96
Rest of the country	16,200	6.578	4.103	0.217	117.095
T- test for equality in means		4.3711 (0.0000)			

3b: Unemployment rate *(percentages)*

	Obs.	Mean	St. dev.	Min	Max
Large cities	6,796	12.83	7.446	3.046	27.580
Rest of the country	16,200	10.84	7.646	1.517	42.975
T-test for equality in means		18.3452 (0.0000)			

3c: College graduates *(shares in total residing population)*

	Obs.	Mean	St. dev.	Min	Max
Large cities	6,796	0.14	0.35	0	1
Rest of the country	16,200	0.11	0.31	0	1
T-test for equality in means		6.1291 (0.0000)			

Source: Survey of Household Income and Wealth.
Notes: P-values are reported in parentheses.

Table 4

SAMPLE STATISTICS

	Total sample			Large cities			Rest of the country		
	No.	Mean	S.D.	No.	Mean	S.D.	No.	Mean	S.D.
Hourly Wage deflated by year (1995)	22,996	6.68	4.62	6,796	6.91	5.66	16,200	6.58	4.10
Age	22,996	39.50	10.83	6,796	39.77	10.85	16,200	39.38	10.83
Labour Experience	22,996	19.52	11.61	6,796	19.61	11.71	16,200	19.48	11.57
Tenure	22,996	14.57	10.91	6,796	14.69	10.98	16,200	14.51	10.89
Years of education	22,996	11.02	3.89	6,796	11.20	4.03	16,200	10.94	3.83
Middle school	22,996	0.31	0.46	6,796	0.30	0.46	16,200	0.32	0.47
High school	22,996	0.45	0.50	6,796	0.45	0.50	16,200	0.46	0.50
Bachelor’s degree or higher	22,996	0.12	0.32	6,796	0.14	0.35	16,200	0.11	0.31
Dummy if female	22,996	0.41	0.49	6,796	0.40	0.49	16,200	0.41	0.49
Dummy if married	22,996	0.65	0.48	6,796	0.64	0.48	16,200	0.65	0.48
Dummy if North resident	22,996	0.48	0.50	6,796	0.53	0.50	16,200	0.46	0.50
Dummy if South resident	22,996	0.30	0.46	6,796	0.30	0.46	16,200	0.30	0.46
Dummy if working in a SME	22,996	0.49	0.50	6,796	0.48	0.50	16,200	0.49	0.50
Dummy if part-time worker	22,996	0.08	0.26	6,796	0.07	0.26	16,200	0.08	0.26
Dummy if working in industry	22,996	0.30	0.46	6,796	0.29	0.45	16,200	0.30	0.46
Dummy if work in construction	22,996	0.05	0.22	6,796	0.05	0.21	16,200	0.05	0.23
Dummy if work in trade	22,996	0.11	0.31	6,796	0.11	0.32	16,200	0.11	0.31
Dummy if work in transport	22,996	0.04	0.20	6,796	0.05	0.22	16,200	0.04	0.19
Dummy if work in banks	22,996	0.04	0.19	6,796	0.04	0.20	16,200	0.04	0.19
Dummy if work in real estate	22,996	0.04	0.19	6,796	0.05	0.21	16,200	0.03	0.18
Dummy if working in the public sector	22,996	0.35	0.48	6,796	0.33	0.47	16,200	0.35	0.48
Dummy if teacher	22,996	0.10	0.29	6,796	0.08	0.28	16,200	0.10	0.30
Dummy if office worker	22,996	0.36	0.48	6,796	0.40	0.49	16,200	0.34	0.47
Dummy if worker supervisor	22,996	0.07	0.25	6,796	0.09	0.29	16,200	0.06	0.23
Dummy if manager	22,996	0.03	0.16	6,796	0.03	0.17	16,200	0.03	0.16
LLM unemployment rate	22,996	11.43	7.64	6,796	12.83	7.45	16,200	10.85	7.65
LLM population level (in thousands)	22,996	574.69	888.86	6,796	1,647.97	1,010.65	16,200	124.44	84.01
LLM employment density (per square kilometre)	22,996	231.70	283.07	6,796	505.97	305.20	16,200	116.64	121.76

Source: Survey of Household Income and Wealth; Labour Force Survey.
Notes: Figures refer to the pooled OLS sample of wage earners (as in Table 5).

Table 5

URBAN WAGE PREMIUM (OLS estimates)

Dependent variable: logarithm of wage	LLM population level								LLM employment density							
	(5.1)		(5.2)		(5.3)		(5.4)		(5.5)		(5.6)		(5.7)		(5.8)	
	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
LLM population	**0.0142**	0.0010	**0.0136**	0.0000	**0.0102**	0.0000	**0.0085**	0.0010								
LLM employment density									**0.0573**	0.0000	**0.0533**	0.0000	**0.0378**	0.0000	**0.0318**	0.0020
Experience	**0.0186**	0.0000	**0.0179**	0.0000	**0.0166**	0.0000	**0.0167**	0.0000	**0.0187**	0.0000	**0.0180**	0.0000	**0.0166**	0.0000	**0.0167**	0.0000
Experience^2	**-0.0003**	0.0000	**-0.0003**	0.0000	**-0.0003**	0.0000	**-0.0003**	0.0000	**-0.0003**	0.0000	**-0.0003**	0.0000	**-0.0003**	0.0000	**-0.0003**	0.0000
Tenure	**0.0130**	0.0000	**0.0083**	0.0000	**0.0073**	0.0000	**0.0075**	0.0000	**0.0131**	0.0000	**0.0083**	0.0000	**0.0074**	0.0000	**0.0075**	0.0000
Tenure^2	**-0.0002**	0.0000	**-0.0001**	0.0330	**-0.0001**	0.0110	**-0.0001**	0.0050	**-0.0002**	0.0000	**-0.0001**	0.0330	**-0.0001**	0.0110	**-0.0001**	0.0050
Education	**0.0543**	0.0000	**0.0420**	0.0000	**0.0239**	0.0000			**0.0544**	0.0000	**0.0421**	0.0000	**0.0240**	0.0000		
Middle school							0.0203	0.1170							**0.0211**	0.1010
Secondary school							**0.0974**	0.0000							**0.0986**	0.0000
First degree or above							**0.2715**	0.0000							**0.2730**	0.0000
Female	**-0.0906**	0.0000	**-0.0976**	0.0000	**-0.1143**	0.0000	**-0.1156**	0.0000	**-0.0904**	0.0000	**-0.0979**	0.0000	**-0.1143**	0.0000	**-0.1156**	0.0000
Married	**0.0964**	0.0000	**0.0822**	0.0000	**0.0760**	0.0000	**0.0749**	0.0000	**0.0952**	0.0000	**0.0812**	0.0000	**0.0752**	0.0000	**0.0742**	0.0000
North	**0.0381**	0.0020	**0.0401**	0.0010	**0.0293**	0.0070	**0.0258**	0.0150	**0.0221**	0.0470	**0.0253**	0.0270	**0.0186**	0.0890	0.0168	0.1200
South	-0.0007	0.9690	-0.0075	0.6570	-0.0176	0.2900	-0.0227	0.1770	-0.0057	0.7400	-0.0127	0.4250	-0.0219	0.1720	-0.0262	0.1050
Year 1998	-0.0148	0.1950	0.0018	0.8680	0.0110	0.3150	0.0133	0.2200	-0.0145	0.2060	0.0021	0.8510	0.0112	0.3090	0.0134	0.2160
Year 2000	**-0.0319**	0.0020	-0.0111	0.3160	-0.0026	0.8340	0.0006	0.9580	**-0.0315**	0.0020	-0.0108	0.3310	-0.0024	0.8460	0.0008	0.9470
Year 2002	-0.0215	0.1190	0.0020	0.8800	0.0155	0.2630	0.0195	0.1600	-0.0216	0.1170	0.0019	0.8870	0.0154	0.2650	0.0194	0.1620
LLM unemployment rate	**-0.0035**	0.0010	**-0.0036**	0.0000	**-0.0036**	0.0000	**-0.0037**	0.0000	**-0.0039**	0.0000	**-0.0040**	0.0000	**-0.0039**	0.0000	-0.0039	0.0000
Part-time			0.0210	0.2550	**0.0333**	0.0640	**0.0349**	0.0480			0.0211	0.2510	**0.0333**	0.0630	0.0350	0.0470
SME			**-0.1328**	0.0000	**-0.1264**	0.0000	**-0.1286**	0.0000			**-0.1319**	0.0000	**-0.1258**	0.0000	-0.1281	0.0000
Industrial sector			**0.0781**	0.0000	**0.0894**	0.0000	**0.0988**	0.0000			**0.0756**	0.0000	**0.0875**	0.0000	0.0972	0.0000
Building sector			**0.0430**	0.0500	**0.0438**	0.0270	**0.0477**	0.0140			**0.0410**	0.0610	**0.0425**	0.0320	**0.0466**	0.0170
Trade sector			**0.0507**	0.0040	**0.0493**	0.0030	**0.0596**	0.0000			**0.0484**	0.0060	**0.0477**	0.0040	**0.0582**	0.0000
Transportation sector			**0.1172**	0.0000	**0.1063**	0.0000	**0.1159**	0.0000			**0.1152**	0.0000	**0.1050**	0.0000	**0.1147**	0.0000
Banking and insurance			**0.2532**	0.0000	**0.2181**	0.0000	**0.2301**	0.0000			**0.2503**	0.0000	**0.2160**	0.0000	**0.2283**	0.0000
Real estate sector			**0.0802**	0.0000	**0.0567**	0.0080	**0.0654**	0.0020			**0.0778**	0.0000	**0.0551**	0.0090	**0.0640**	0.0020
Public sector			**0.1547**	0.0000	**0.0907**	0.0000	**0.1004**	0.0000			**0.1543**	0.0000	**0.0906**	0.0000	**0.1003**	0.0000
Teacher				0.0000	**0.3604**	0.0000	**0.3842**	0.0000					**0.3591**	0.0000	**0.3831**	0.0000
Office worker					**0.1080**	0.0000	**0.1370**	0.0000					**0.1078**	0.0000	**0.1367**	0.0000
Worker supervisor					**0.2484**	0.0000	**0.2729**	0.0000					**0.2492**	0.0000	**0.2735**	0.0000
Manager					**0.4738**	0.0000	**0.4885**	0.0000					**0.4733**	0.0000	**0.4881**	0.0000
Constant	**0.8209**	0.0000	**0.9752**	0.0000	**1.1431**	0.0000	**1.3156**	0.0000	**0.8299**	0.0000	**0.9854**	0.0000	**1.1502**	0.0000	**1.3215**	0.0000
Observations		22,996		22,996		22,996		22,996		22,996		22,996		22,996		22,996
R^2		.3289		.3713		.4058		.4043		.3292		.3715		.4058		.4043

Table 5 (continued)

URBAN WAGE PREMIUM (OLS estimates)

Dependent variable: logarithm of wage	Large city								LLM employment density and large city							
	(5.9)		(5.10)		(5.11)		(5.12)		(5.13)		(5.14)		(5.15)		(5.16)	
	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
LLM employment density									**0.0521**	0.0020	**0.0440**	0.0040	**0.0282**	0.0490	0.0228	0.1080
Large city	**0.0250**	0.0290	**0.0256**	0.0120	**0.0198**	0.0180	**0.0171**	0.0360	**0.0049**	0.6860	0.0088	0.4420	0.0091	0.3950	0.0085	0.4210
Experience	**0.0187**	0.0000	**0.0179**	0.0000	**0.0166**	0.0000	**0.0167**	0.0000	**0.0187**	0.0000	**0.0179**	0.0000	**0.0166**	0.0000	**0.0167**	0.0000
Experience^2	**-0.0003**	0.0000	**-0.0003**	0.0000	**-0.0003**	0.0000	**-0.0003**	0.0000	**-0.0003**	0.0000	**-0.0003**	0.0000	**-0.0003**	0.0000	**-0.0003**	0.0000
Tenure	**0.0130**	0.0000	**0.0083**	0.0000	**0.0073**	0.0000	**0.0075**	0.0000	**0.0131**	0.0000	**0.0083**	0.0000	**0.0074**	0.0000	**0.0075**	0.0000
Tenure^2	**-0.0002**	0.0000	**-0.0001**	0.0340	**-0.0001**	0.0110	**-0.0001**	0.0060	**-0.0002**	0.0000	**-0.0001**	0.0340	**-0.0001**	0.0110	**-0.0001**	0.0060
Education	**0.0543**	0.0000	**0.0420**	0.0000	**0.0238**	0.0000			**0.0543**	0.0000	**0.0420**	0.0000	**0.0239**	0.0000		
Middle school							0.0201	0.1190							0.0208	0.1050
Secondary school							**0.0971**	0.0000							**0.0982**	0.0000
First degree or above							**0.2715**	0.0000							**0.2721**	0.0000
Female	**-0.0907**	0.0000	**-0.0976**	0.0000	**-0.1142**	0.0000	**-0.1155**	0.0000	**-0.0905**	0.0000	**-0.0979**	0.0000	**-0.1144**	0.0000	**-0.1156**	0.0000
Married	**0.0959**	0.0000	**0.0819**	0.0000	**0.0758**	0.0000	**0.0747**	0.0000	**0.0954**	0.0000	**0.0814**	0.0000	**0.0755**	0.0000	**0.0745**	0.0000
North	**0.0317**	0.0070	**0.0340**	0.0040	**0.0247**	0.0220	**0.0219**	0.0370	**0.0229**	0.0520	**0.0267**	0.0250	**0.0201**	0.0750	**0.0182**	0.1040
South	-0.0104	0.5420	-0.0163	0.2960	-0.0240	0.1310	**-0.0278**	0.0830	-0.0054	0.7530	-0.0121	0.4390	-0.0213	0.1780	-0.0257	0.1090
Year 1998	-0.0151	0.1860	0.0016	0.8880	0.0108	0.3240	0.0131	0.2260	-0.0145	0.2050	0.0020	0.8540	0.0111	0.3100	0.0133	0.2170
Year 2000	**-0.0321**	0.0020	-0.0113	0.3140	-0.0027	0.8280	0.0005	0.9630	**-0.0315**	0.0020	-0.0108	0.3300	-0.0024	0.8450	0.0008	0.9480
Year 2002	-0.0220	0.1120	0.0017	0.9030	0.0152	0.2720	0.0193	0.1650	-0.0216	0.1160	0.0019	0.8900	0.0153	0.2670	0.0193	0.1630
LLM unemployment rate	**-0.0033**	0.0020	**-0.0034**	0.0000	**-0.0035**	0.0000	**-0.0037**	0.0000	**-0.0039**	0.0000	**-0.0040**	0.0000	**-0.0038**	0.0000	**-0.0039**	0.0000
Part-time			0.0197	0.2880	**0.0324**	0.0720	**0.0341**	0.0540			0.0207	0.2590	**0.0330**	0.0650	**0.0346**	0.0490
SME			**-0.1327**	0.0000	**-0.1263**	0.0000	**-0.1285**	0.0000			**-0.1320**	0.0000	**-0.1258**	0.0000	**-0.1282**	0.0000
Industrial sector			**0.0776**	0.0000	**0.0889**	0.0000	**0.0984**	0.0000			**0.0758**	0.0000	**0.0877**	0.0000	**0.0974**	0.0000
Building sector			**0.0423**	0.0540	**0.0433**	0.0290	**0.0473**	0.0150			**0.0411**	0.0620	**0.0426**	0.0330	**0.0467**	0.0170
Trade sector			**0.0496**	0.0050	**0.0484**	0.0040	**0.0589**	0.0000			**0.0484**	0.0060	**0.0477**	0.0040	**0.0582**	0.0000
Transportation sector			**0.1177**	0.0000	**0.1066**	0.0000	**0.1161**	0.0000			**0.1151**	0.0000	**0.1050**	0.0000	**0.1147**	0.0000
Banking and insurance			**0.2541**	0.0000	**0.2184**	0.0000	**0.2304**	0.0000			**0.2506**	0.0000	**0.2165**	0.0000	**0.2288**	0.0000
Real estate sector			**0.0788**	0.0000	**0.0554**	0.0090	**0.0643**	0.0020			**0.0773**	0.0000	**0.0547**	0.0100	**0.0637**	0.0030
Public sector			**0.1543**	0.0000	**0.0904**	0.0000	**0.1001**	0.0000			**0.1543**	0.0000	**0.0907**	0.0000	**0.1003**	0.0000
Teacher					**0.3604**	0.0000	**0.3840**	0.0000			**0.9845**	0.0000	**0.3593**	0.0000	**0.3833**	0.0000
Office worker					**0.1083**	0.0000	**0.1372**	0.0000			**0.0778**	0.0000	**0.1076**	0.0000	**0.1365**	0.0000
Worker supervisor					**0.2499**	0.0000	**0.2739**	0.0000					**0.2486**	0.0000	**0.2730**	0.0000
Manager					**0.4744**	0.0000	**0.4887**	0.0000					**0.4731**	0.0000	**0.4879**	0.0000
Constant	**0.8254**	0.0000	**0.9801**	0.0000	**1.1469**	0.0000	**1.3188**	0.0000	**0.8294**	0.0000	**0.1543**	0.0000	**1.1493**	0.0000	**1.3204**	0.0000
Observations		22,996		22,996		22,996		22,996		22,996		22,996		22,996		22,996
R^2		.3286		.3711		.4057		4042		.3292		.3715		.4059		.4044

Notes: Regressions are weighted to population proportions and White-robust standard errors adjusted for clustering at the LLM level.

Table 6

URBAN WAGE PREMIUM USING DIFFERENT PERCENTILES (OLS estimates)

Dependent variable: logarithm of wage	LLM population level										LLM employment density							
	(6.1)		(6.2)		(6.3)		(6.4)		(6.5)		(6.6)		(6.7)		(6.8)		(6.9)	
	75th percentile		90th percentile		95th percentile		99th percentile		HH-HL		75th percentile		90th percentile		95th percentile		99th percentile	
	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
LLM percentiles	0.0214	0.0070	0.0189	0.0230	0.0155	0.0920	0.0301	0.0000			0.0161	0.0500	0.0214	0.0170	0.0266	0.0240	0.0459	0.0020
HH									0.0180	0.1850								
HL									0.0213	0.0470								
Experience	0.0165	0.0000	0.0166	0.0000	0.0166	0.0000	0.0166	0.0000	0.0166	0.0000	0.0166	0.0000	0.0166	0.0000	0.0166	0.0000	0.0166	0.0000
Experience^2	-0.0003	0.0000	-0.0003	0.0000	-0.0003	0.0000	-0.0003	0.0000	-0.0003	0.0000	-0.0003	0.0000	-0.0003	0.0000	-0.0003	0.0000	-0.0003	0.0000
Tenure	0.0074	0.0000	0.0073	0.0000	0.0073	0.0000	0.0074	0.0000	0.0073	0.0000	0.0074	0.0000	0.0073	0.0000	0.0073	0.0000	0.0074	0.0000
Tenure^2	-0.0001	0.0100	-0.0001	0.0110	-0.0001	0.0110	-0.0001	0.0110	-0.0001	0.0110	-0.0001	0.0100	-0.0001	0.0110	-0.0001	0.0110	-0.0001	0.0110
Education	0.0238	0.0000	0.0239	0.0000	0.0239	0.0000	0.0239	0.0000	0.0238	0.0000	0.0239	0.0000	0.0239	0.0000	0.0240	0.0000	0.0240	0.0000
Female	-0.1140	0.0000	-0.1142	0.0000	-0.1142	0.0000	-0.1141	0.0000	-0.1142	0.0000	-0.1139	0.0000	-0.1143	0.0000	-0.1143	0.0000	-0.1140	0.0000
Married	0.0759	0.0000	0.0758	0.0000	0.0757	0.0000	0.0759	0.0000	0.0759	0.0000	0.0754	0.0000	0.0757	0.0000	0.0751	0.0000	0.0746	0.0000
North	0.0225	0.0350	0.0246	0.0220	0.0259	0.0190	0.0296	0.0050	0.0253	0.0250	0.0228	0.0370	0.0244	0.0210	0.0174	0.1460	0.0191	0.0920
South	-0.0266	0.0870	-0.0246	0.1210	-0.0243	0.1350	-0.0179	0.2760	-0.0230	0.1690	-0.0221	0.1750	-0.0188	0.2600	-0.0256	0.1250	-0.0283	0.0840
Year 1998	0.0109	0.3220	0.0108	0.3240	0.0108	0.3260	0.0110	0.3140	0.0108	0.3240	0.0108	0.3270	0.0110	0.3150	0.0110	0.3160	0.0111	0.3080
Year 2000	-0.0027	0.8280	-0.0026	0.8310	-0.0028	0.8210	-0.0026	0.8340	-0.0027	0.8260	-0.0028	0.8180	-0.0026	0.8300	-0.0025	0.8380	-0.0023	0.8490
Year 2002	0.0152	0.2730	0.0153	0.2690	0.0153	0.2680	0.0155	0.2630	0.0153	0.2720	0.0154	0.2640	0.0153	0.2710	0.0153	0.2680	0.0152	0.2700
LLM unempl. rate	-0.0034	0.0000	-0.0035	0.0000	-0.0034	0.0000	-0.0036	0.0000	-0.0036	0.0000	-0.0036	0.0000	-0.0038	0.0000	-0.0038	0.0000	-0.0033	0.0000
Part-time	0.0326	0.0710	0.0324	0.0720	0.0329	0.0680	0.0335	0.0620	0.0324	0.0730	0.0325	0.0710	0.0339	0.0590	0.0335	0.0610	0.0333	0.0630
SME	-0.1262	0.0000	-0.1262	0.0000	-0.1262	0.0000	-0.1266	0.0000	-0.1263	0.0000	-0.1264	0.0000	-0.1263	0.0000	-0.1255	0.0000	-0.1252	0.0000
Industrial sector	0.0885	0.0000	0.0889	0.0000	0.0891	0.0000	0.0895	0.0000	0.0890	0.0000	0.0889	0.0000	0.0890	0.0000	0.0877	0.0000	0.0893	0.0000
Building sector	0.0428	0.0320	0.0432	0.0290	0.0436	0.0270	0.0439	0.0260	0.0433	0.0290	0.0426	0.0310	0.0433	0.0290	0.0426	0.0310	0.0444	0.0220
Trade sector	0.0479	0.0040	0.0483	0.0040	0.0485	0.0030	0.0494	0.0030	0.0484	0.0040	0.0484	0.0030	0.0489	0.0030	0.0477	0.0040	0.0492	0.0030
Transportation sector	0.1068	0.0000	0.1067	0.0000	0.1068	0.0000	0.1064	0.0000	0.1065	0.0000	0.1068	0.0000	0.1068	0.0000	0.1061	0.0000	0.1071	0.0000
Banking and insur.	0.2184	0.0000	0.2184	0.0000	0.2184	0.0000	0.2174	0.0000	0.2185	0.0000	0.2183	0.0000	0.2176	0.0000	0.2163	0.0000	0.2166	0.0000
Real estate sector	0.0549	0.0100	0.0555	0.0090	0.0563	0.0080	0.0573	0.0070	0.0555	0.0080	0.0562	0.0080	0.0563	0.0080	0.0553	0.0090	0.0571	0.0070
Public sector	0.0899	0.0000	0.0902	0.0000	0.0903	0.0000	0.0906	0.0000	0.0903	0.0000	0.0902	0.0000	0.0905	0.0000	0.0904	0.0000	0.0922	0.0000
Teacher	0.3597	0.0000	0.3604	0.0000	0.3606	0.0000	0.3602	0.0000	0.3606	0.0000	0.3601	0.0000	0.3604	0.0000	0.3595	0.0000	0.3590	0.0000
Office worker	0.1079	0.0000	0.1083	0.0000	0.1086	0.0000	0.1082	0.0000	0.1083	0.0000	0.1085	0.0000	0.1088	0.0000	0.1088	0.0000	0.1079	0.0000
Worker supervisor	0.2494	0.0000	0.2501	0.0000	0.2506	0.0000	0.2489	0.0000	0.2498	0.0000	0.2506	0.0000	0.2500	0.0000	0.2512	0.0000	0.2503	0.0000
Manager	0.4741	0.0000	0.4744	0.0000	0.4745	0.0000	0.4741	0.0000	0.4745	0.0000	0.4750	0.0000	0.4747	0.0000	0.4746	0.0000	0.4734	0.0000
Constant	1.1452	0.0000	1.1469	0.0000	1.1469	0.0000	1.1446	0.0000	1.1470	0.0000	1.1470	0.0000	1.1490	0.0000	1.1557	0.0000	1.1489	0.0000
Observations	22,996		22,996		22,996		22,996		22,996		22,996		22,996		22,996		22,996	
R^2	.4058		.4057		.4055		.4058		.4057		.4056		.4056		.4056		.4059	

Notes: Regressions are weighted to population proportions and White-robust standard errors adjusted for clustering at the LLM level.

Table 7

URBAN WAGE PREMIUM (instrumental variable and OLS estimates)

Dependent var: log wages	Ability sub-sample								Ability sub-sample								IV on education							
	(7.1)		(7.2)		(7.3)		(7.4)		(7.5)		(7.6)		(7.7)		(7.8)		(7.9)		(7.10)		(7.11)		(7.12)	
	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
LLM population	0.0048	0.3640							0.0056	0.2850							**0.0092**	0.0100						
LLM empl. den			0.0122	0.5680			-0.0080	0.7950			0.0132	0.5360			-0.0066	0.8320			**0.0468**	0.0000			**0.0550**	0.0010
Large city					0.0167	0.3060	0.0196	0.3820					0.0168	0.2990	0.0193	0.3910					0.0130	0.2100	-0.0078	0.5070
Experience	**0.0192**	0.0000	**0.0191**	0.0000	**0.0192**	0.0000	**0.0192**	0.0000	**0.0192**	0.0000	**0.0191**	0.0000	**0.0191**	0.0000	**0.0191**	0.0000	**0.0187**	0.0000	**0.0187**	0.0000	**0.0188**	0.0000	**0.0188**	0.0000
Experience^2	**-0.0004**	0.0000	**-0.0004**	0.0000	**-0.0004**	0.0000	**-0.0004**	0.0000	**-0.0004**	0.0000	**-0.0004**	0.0000	**-0.0004**	0.0000	**-0.0004**	0.0000	**-0.0002**	0.0000	**-0.0002**	0.0000	**-0.0002**	0.0000	**-0.0002**	0.0000
Tenure	**0.0077**	0.0520	**0.0077**	0.0500	**0.0077**	0.0530	**0.0077**	0.0530	**0.0074**	0.0620	**0.0074**	0.0590	**0.0074**	0.0620	**0.0074**	0.0630	**0.0076**	0.0000	**0.0076**	0.0000	**0.0076**	0.0000	**0.0076**	0.0000
Tenure^2	0.0000	0.8970	0.0000	0.8930	0.0000	0.8950	0.0000	0.8910	0.0000	0.9710	0.0000	0.9640	0.0000	0.9650	0.0000	0.9620	**-0.0001**	0.0190	**-0.0001**	0.0200	**-0.0001**	0.0190	**-0.0001**	0.0200
Education	**0.0373**	0.0000	**0.0375**	0.0000	**0.0371**	0.0000	**0.0372**	0.0000	**0.0344**	0.0000	**0.0347**	0.0000	**0.0344**	0.0000	**0.0344**	0.0000	**0.0503**	0.0000	**-0.1115**	0.0000	**-0.1111**	0.0000	**-0.1114**	0.0000
Female	**-0.1024**	0.0000	**-0.1023**	0.0000	**-0.1027**	0.0000	**-0.1027**	0.0000	**-0.1036**	0.0000	**-0.1034**	0.0000	**-0.1038**	0.0000	**-0.1038**	0.0000	**-0.1113**	0.0000	**0.0502**	0.0000	**0.0505**	0.0000	**0.0504**	0.0000
Married	**0.0841**	0.0000	**0.0836**	0.0000	**0.0846**	0.0000	**0.0847**	0.0000	**0.0857**	0.0000	**0.0851**	0.0000	**0.0861**	0.0000	**0.0861**	0.0000	**0.0733**	0.0000	**0.0726**	0.0000	**0.0729**	0.0000	**0.0723**	0.0000
North																	**0.0341**	0.0040	**0.0221**	0.0500	**0.0301**	0.0090	**0.0210**	0.0720
South																	-0.0043	0.8280	-0.0056	0.7520	-0.0115	0.5350	-0.0060	0.7320
Year 1998	0.0088	0.6380	0.0046	0.8270	0.0063	0.7420	0.0077	0.7280	0.0098	0.6000	0.0052	0.8080	0.0070	0.7160	0.0082	0.7140								
Year 2000	0.0101	0.7160	0.0069	0.7930	0.0088	0.7380	0.0081	0.7660	0.0114	0.6850	0.0074	0.7800	0.0092	0.7290	0.0086	0.7530								
Year 2002	0.0110	0.4510	0.0109	0.4550	0.0109	0.4550	0.0109	0.4540	0.0101	0.4910	0.0100	0.4950	0.0100	0.4940	0.0100	0.4940	0.0025	0.8210	0.0022	0.8430	0.0022	0.8430	0.0021	0.8480
Unemploy.rate	**-0.0050**	0.0120	**-0.0050**	0.0140	**-0.0051**	0.0110	**-0.0050**	0.0170	**-0.0050**	0.0130	**-0.0050**	0.0150	**-0.0051**	0.0110	**-0.0050**	0.0170	**-0.0035**	0.0030	**-0.0039**	0.0010	**-0.0033**	0.0050	**-0.0039**	0.0000
Part-time	-0.0267	0.4500	-0.0269	0.4450	-0.0270	0.4440	-0.0272	0.4380	-0.0256	0.4650	-0.0260	0.4580	-0.0261	0.4560	-0.0263	0.4510	**0.0482**	0.0080	**0.0484**	0.0080	**0.0474**	0.0100	**0.0487**	0.0070
SME	**-0.1208**	0.0000	**-0.1201**	0.0000	**-0.1207**	0.0000	**-0.1209**	0.0000	**-0.1197**	0.0000	**-0.1189**	0.0000	**-0.1196**	0.0000	**-0.1197**	0.0000	**-0.1175**	0.0000	**-0.1167**	0.0000	**-0.1174**	0.0000	**-0.1165**	0.0000
Industry	**0.1374**	0.0000	**0.1375**	0.0000	**0.1375**	0.0000	**0.1377**	0.0000	**0.1366**	0.0000	**0.1368**	0.0000	**0.1368**	0.0000	**0.1369**	0.0000	**0.0759**	0.0000	**0.0740**	0.0000	**0.0757**	0.0000	**0.0736**	0.0000
Building sector	0.0232	0.6200	0.0234	0.6160	0.0231	0.6210	0.0231	0.6210	0.0215	0.6460	0.0219	0.6400	0.0215	0.6460	0.0215	0.6450	**0.0363**	0.0830	**0.0350**	0.0930	**0.0358**	0.0900	**0.0349**	0.0930
Trade sector	**0.1110**	0.0020	**0.1107**	0.0020	**0.1100**	0.0020	**0.1097**	0.0020	**0.1097**	0.0020	**0.1093**	0.0020	**0.1087**	0.0030	**0.1084**	0.0030	**0.0370**	0.0460	**0.0354**	0.0550	**0.0362**	0.0500	**0.0352**	0.0570
Transport. sect	**0.1227**	0.0180	**0.1235**	0.0170	**0.1219**	0.0190	**0.1222**	0.0180	**0.1227**	0.0170	**0.1236**	0.0160	**0.1222**	0.0170	**0.1224**	0.0170	**0.1107**	0.0000	**0.1087**	0.0000	**0.1112**	0.0000	**0.1086**	0.0000
Banking	**0.2657**	0.0000	**0.2655**	0.0000	**0.2662**	0.0000	**0.2666**	0.0000	**0.2650**	0.0000	**0.2648**	0.0000	**0.2656**	0.0000	**0.2660**	0.0000	**0.1801**	0.0000	**0.1780**	0.0000	**0.1800**	0.0000	**0.1772**	0.0000
Real estate	**0.1437**	0.0000	**0.1438**	0.0000	**0.1430**	0.0000	**0.1429**	0.0000	**0.1435**	0.0000	**0.1436**	0.0000	**0.1429**	0.0000	**0.1428**	0.0000	0.0335	0.1130	0.0317	0.1290	0.0326	0.1170	0.0318	0.1250
Public sector	**0.1071**	0.0180	**0.1079**	0.0170	**0.1076**	0.0170	**0.1073**	0.0180	**0.1063**	0.0190	**0.1073**	0.0190	**0.1069**	0.0190	**0.1066**	0.0190	**0.0663**	0.0000	**0.0671**	0.0000	**0.0657**	0.0000	**0.0670**	0.0000
Teacher	**0.2895**	0.0000	**0.2889**	0.0000	**0.2893**	0.0000	**0.2897**	0.0000	**0.2866**	0.0000	**0.2861**	0.0000	**0.2866**	0.0000	**0.2869**	0.0000	**0.1959**	0.0000	**0.1958**	0.0000	**0.1951**	0.0000	**0.1942**	0.0000
Office worker	**0.1268**	0.0000	**0.1271**	0.0000	**0.1264**	0.0000	**0.1268**	0.0000	**0.1272**	0.0000	**0.1277**	0.0000	**0.1271**	0.0000	**0.1274**	0.0000	**0.0295**	0.0770	**0.0294**	0.0760	**0.0297**	0.0780	**0.0289**	0.0850
Worker superv.	**0.2837**	0.0000	**0.2847**	0.0000	**0.2831**	0.0000	**0.2838**	0.0000	**0.2818**	0.0000	**0.2833**	0.0000	**0.2818**	0.0000	**0.2824**	0.0000	**0.1291**	0.0000	**0.1295**	0.0000	**0.1306**	0.0000	**0.1290**	0.0000
Manager	**0.4859**	0.0000	**0.4857**	0.0000	**0.4856**	0.0000	**0.4862**	0.0000	**0.4799**	0.0000	**0.4799**	0.0000	**0.4800**	0.0000	**0.4805**	0.0000	**0.2787**	0.0000	**0.2789**	0.0000	**0.2790**	0.0000	**0.2774**	0.0000
Mark									-0.0007	0.9930	0.0002	0.9980	-0.0020	0.9820	-0.0021	0.9810								
Laude									**0.0712**	0.0310	**0.0701**	0.0320	**0.0700**	0.0320	**0.0699**	0.0330								
Constant	**0.9115**	0.0000	**0.9120**	0.0000	**0.9143**	0.0000	**0.9130**	0.0000	**0.9502**	0.0000	**0.9496**	0.0000	**0.9524**	0.0000	**0.9512**	0.0000	**0.8678**	0.0000	**0.8769**	0.0000	**0.8699**	0.0000	**0.8754**	0.0000
Observations	5,314		5,314		5,314		5,314		5,314		5,314		5,314		5,314		19,310		19,310		19,310		19,310	
R^2	.3797		.3797		.3799		.3799		.3807		.3806		.3808		.3808		.4055		.4061		.4050		.4058	

Notes: Regressions are weighted to population proportions and White-robust standard errors adjusted for clustering at the LLM level. The variables used to instrument education in (7.9)-(7.12) are: parents' age, educational attainment and wok status.

Table 8

SENSITIVITY CHECKS ON URBAN WAGE PREMIUM (OLS estimates)

Dep. variable: log of wage	Regional fixed effects								Centre-North sub-sample								South sub-sample							
	(8.1)		(8.2)		(8.3)		(8.4)		(8.5)		(8.6)		(8.7)		(8.8)		(8.9)		(8.10)		(8.11)		(8.12)	
	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
LLM population	0.0111	0.0070							0.0095	0.0260							0.0189	0.0100						
LLM empl. den			0.0290	0.0540			0.0016	0.9320			0.0521	0.0000			0.0554	0.0010			0.0271	0.3700			-0.0039	0.9010
Large city					0.0229	0.0050	0.0223	0.0400					0.0211	0.0600	-0.0033	0.7930					0.0294	0.0680	0.0306	0.0960
Experience	0.0166	0.0000	0.0167	0.0000	0.0166	0.0000	0.0166	0.0000	0.0152	0.0000	0.0152	0.0000	0.0152	0.0000	0.0152	0.0000	0.0174	0.0000	0.0175	0.0000	0.0174	0.0000	0.0174	0.0000
Experience^2	-0.0003	0.0000	-0.0003	0.0000	-0.0003	0.0000	-0.0003	0.0000	-0.0002	0.0000	-0.0002	0.0000	-0.0002	0.0000	-0.0002	0.0000	-0.0003	0.0000	-0.0003	0.0000	-0.0003	0.0000	-0.0003	0.0000
Tenure	0.0072	0.0000	0.0072	0.0000	0.0072	0.0000	0.0072	0.0000	0.0082	0.0000	0.0082	0.0000	0.0082	0.0000	0.0082	0.0000	0.0073	0.0030	0.0074	0.0020	0.0073	0.0030	0.0073	0.0030
Tenure^2	-0.0001	0.0130	-0.0001	0.0130	-0.0001	0.0140	-0.0001	0.0140	-0.0001	0.0000	-0.0001	0.0000	-0.0001	0.0000	-0.0001	0.0000	0.0000	0.7190	0.0000	0.6990	0.0000	0.7300	0.0000	0.7310
Education	0.0241	0.0000	0.0242	0.0000	0.0241	0.0000	0.0241	0.0000	0.0235	0.0000	0.0236	0.0000	0.0235	0.0000	0.0236	0.0000	0.0236	0.0000	0.0235	0.0000	0.0235	0.0000	0.0235	0.0000
Female	-0.1144	0.0000	-0.1141	0.0000	-0.1144	0.0000	-0.1144	0.0000	-0.1157	0.0000	-0.1159	0.0000	-0.1156	0.0000	-0.1159	0.0000	-0.1189	0.0000	-0.1189	0.0000	-0.1190	0.0000	-0.1190	0.0000
Valle d'Aosta	0.0378	0.0040	0.0393	0.0040	0.0403	0.0050	0.0405	0.0050																
Lombardy	0.0288	0.0470	0.0270	0.0610	0.0325	0.0270	0.0322	0.0400																
Trentino	0.0732	0.0000	0.0731	0.0000	0.0759	0.0000	0.0760	0.0000																
Veneto	-0.0172	0.2760	-0.0177	0.2620	-0.0221	0.1840	-0.0219	0.1960																
Friuli VG	0.0190	0.3510	0.0183	0.3340	0.0234	0.2640	0.0234	0.2630																
Liguria	-0.0225	0.3030	-0.0214	0.3230	-0.0273	0.2730	-0.0270	0.2820																
Emilia Romag.	0.0180	0.2840	0.0176	0.3020	0.0190	0.2640	0.0190	0.2630																
Tuscany	0.0328	0.0270	0.0338	0.0240	0.0331	0.0430	0.0333	0.0440																
Umbria	-0.0853	0.0010	-0.0838	0.0010	-0.0821	0.0020	-0.0819	0.0020																
Marche	-0.0572	0.0040	-0.0585	0.0030	-0.0546	0.0070	-0.0546	0.0070																
Lazio	-0.0416	0.0090	-0.0229	0.2240	-0.0303	0.0850	-0.0300	0.0970																
Abruzzo	-0.0358	0.2080	-0.0354	0.2190	-0.0329	0.2530	-0.0328	0.2550																
Molise	-0.0339	0.3350	-0.0308	0.3860	-0.0314	0.3780	-0.0311	0.3860																
Campania	-0.0734	0.0270	-0.0709	0.0330	-0.0687	0.0420	-0.0687	0.0420																
Puglia	-0.0489	0.0090	-0.0417	0.0280	-0.0529	0.0100	-0.0523	0.0140																
Basilicata	-0.0776	0.2640	-0.0735	0.2910	-0.0752	0.2800	-0.0748	0.2830																
Calabria	-0.0842	0.0360	-0.0801	0.0500	-0.0807	0.0490	-0.0803	0.0520																
Sicily	-0.0767	0.0130	-0.0721	0.0240	-0.0768	0.0130	-0.0763	0.0140																
Sardinia	-0.0075	0.8430	-0.0032	0.9330	-0.0066	0.8630	-0.0062	0.8740																
Constant	1.1461	0.0000	1.1448	0.0000	1.1449	0.0000	1.1448	0.0000	1.1917	0.0000	1.1813	0.0000	1.1903	0.0000	1.1806	0.0000	1.1779	0.0000	1.1816	0.0000	1.1728	0.0000	1.1716	0.0000
Observations	22,996		22,996		22,996		22,996		16,058		16,058		16,058		16,058		6,938		6,938		6,938		6,938	
R^2	.4089		.4087		.4090		.4090		.4041		.4050		.4041		.4050		.4235		.4230		.4234		.4234	

Notes: Regressions are weighted to population proportions and White-robust standard errors adjusted for clustering at the LLM level. The other control variables, not reported here for space constraints, are those corresponding to specifications (5.3), (5.7), (5.11) and (5.15).

Table 9

URBAN WAGE STRUCTURE (OLS estimates) (it continues)

Dependent variable: logarithm of wage	LLM population level								LLM employment density							
	(9.1)		(9.2)		(9.3)		(9.4)		(9.5)		(9.6)		(9.7)		(9.8)	
	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
LLM population level	0.0540	0.1630	0.0163	0.6230	0.0105	0.7170	-0.0009	0.9740								
LLM employment density									**0.2077**	0.0950	0.1094	0.3550	0.1020	0.3620	0.0392	0.7020
*Experience *A*	**0.0016**	0.0860	**0.0018**	0.0210	**0.0013**	0.0820	**0.0014**	0.0650	**0.0058**	0.0610	**0.0059**	0.0380	0.0043	0.1290	**0.0045**	0.1000
Experience^2 **A*	0.0000	0.1190	**0.0000**	0.0640	0.0000	0.1340	0.0000	0.1180	**-0.0001**	0.0950	-0.0001	0.1390	-0.0001	0.2760	-0.0001	0.2860
*Tenure *A*	**-0.0014**	0.0190	-0.0012	0.0810	**-0.0016**	0.0250	**-0.0017**	0.0110	**-0.0079**	0.0290	**-0.0067**	0.0420	**-0.0076**	0.0670	**-0.0083**	0.0460
Tenure^2 **A*	0.0000	0.4270	0.0000	0.8120	0.0000	0.2530	0.0000	0.1290	**0.0002**	0.0850	0.0001	0.2140	**0.0002**	0.0750	**0.0002**	0.0390
*Education *A*	-0.0012	0.2020	-0.0007	0.5610	**-0.0018**	0.0240			-0.0041	0.3060	-0.0007	0.8690	-0.0044	0.1960		
*Middle school *A*							-0.0018	0.8260							0.0102	0.7310
*Secondary school *A*							-0.0099	0.5150							-0.0080	0.8660
*First degree or above *A*							**-0.0351**	0.0030							**-0.0893**	0.0310
*Female *A*	**-0.0140**	0.0830	-0.0107	0.1170	**-0.0089**	0.0530	**-0.0094**	0.0430	**-0.0630**	0.0080	**-0.0546**	0.0040	**-0.0345**	0.0600	**-0.0363**	0.0450
*Married *A*	-0.0001	0.9920	0.0029	0.7550	0.0061	0.4500	0.0060	0.4650	0.0023	0.9250	0.0264	0.3140	0.0265	0.2800	0.0295	0.2450
*North *A*	-0.0020	0.8690	-0.0082	0.4660	-0.0023	0.8290	-0.0018	0.8580	-0.0647	0.3090	-0.1041	0.1260	-0.0923	0.1770	-0.0727	0.2810
*South *A*	0.0489	0.1900	**0.0542**	0.0970	0.0313	0.3210	0.0259	0.3900	-0.0595	0.6130	-0.0817	0.4590	-0.1423	0.2000	-0.1633	0.1420
*Year 1998 *A*	**0.0164**	0.0800	0.0134	0.1740	0.0143	0.1690	0.0134	0.1980	0.0363	0.3500	0.0190	0.6190	0.0169	0.6880	0.0146	0.7270
*Year 2000 *A*	0.0109	0.1980	0.0157	0.1530	0.0170	0.2210	0.0145	0.2860	0.0354	0.2160	0.0220	0.5190	0.0081	0.8680	0.0021	0.9640
*Year 2002 *A*	-0.0005	0.9520	0.0002	0.9830	-0.0034	0.7650	-0.0044	0.6970	-0.0033	0.9120	-0.0044	0.8940	-0.0220	0.6150	-0.0257	0.5600
*LLM unemploym.t rate*A*	-0.0025	0.2750	-0.0029	0.1450	-0.0014	0.4490	-0.0012	0.5060	-0.0020	0.7360	-0.0024	0.6500	0.0017	0.7460	0.0036	0.4890
*Part-time *A*			-0.0050	0.8710	-0.0057	0.8390	-0.0066	0.8090			-0.0735	0.3320	-0.0673	0.3370	-0.0679	0.3140
*SME *A*			0.0153	0.1920	**0.0190**	0.0940	0.0182	0.1050			**0.0701**	0.0590	0.0617	0.1050	0.0554	0.1420
*Industrial sector *A*			**0.0254**	0.0860	0.0130	0.3350	0.0085	0.5280			0.0253	0.6250	0.0046	0.9180	-0.0108	0.7980
*Building sector *A*			0.0004	0.9860	-0.0099	0.5900	-0.0130	0.4780			-0.0633	0.2790	-0.0624	0.1580	**-0.0713**	0.0920
*Trade sector *A*			0.0095	0.3330	-0.0052	0.5830	-0.0099	0.2980			0.0495	0.2090	0.0221	0.5550	0.0052	0.8920
*Transportation sector*A*			0.0176	0.2850	-0.0011	0.9460	-0.0074	0.6390			0.0303	0.6900	-0.0021	0.9750	-0.0201	0.7600
*Banking and insurance*A*			0.0028	0.8560	-0.0173	0.2460	-0.0192	0.2390			-0.0274	0.6190	-0.0674	0.1950	-0.0780	0.1350
*Real estate sector *A*			**0.0396**	0.0000	**0.0263**	0.0150	**0.0229**	0.0320			**0.1392**	0.0310	**0.1091**	0.0980	0.1002	0.1180
*Public sector *A*			**0.0284**	0.0260	**0.0232**	0.0330	**0.0191**	0.0780			0.0614	0.3460	**0.0658**	0.0930	0.0539	0.1510
*Teacher *A*					0.0027	0.9360	0.0072	0.8280					-0.0790	0.5350	-0.0553	0.6460
*Office worker*A*					**0.0130**	0.0290	**0.0126**	0.0100					0.0340	0.1430	**0.0331**	0.0960
*Worker supervisor *A*					**0.0487**	0.0050	**0.0514**	0.0020					**0.1699**	0.0020	**0.1817**	0.0020
*Manager *A*					0.0038	0.9260	0.0109	0.7920					**0.1350**	0.0190	**0.1647**	0.0080
Constant	0.8103	0.0000	0.9947	0.0000	1.1555	0.0000	1.3306	0.0000	0.7982	0.0000	0.9809	0.0000	1.1416	0.0000	1.3234	0.0000
Observations	22,996	22,996	22,996	22,996	22,996	22,996	22,996	22,996								
R^2	.3301	.3731	.4082	.4068	.3302	.3733	.4087	.4074								
It continues….																

Table 9 (continued)

URBAN WAGE STRUCTURE (OLS estimates)

Dependent variable: logarithm of wage	Large city								LLM employment density and large city							
	(9.9)		(9.10)		(9.11)		(9.12)		(9.13)		(9.14)		(9.15)		(9.16)	
	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
LLM employment density									0.1577	0.3590	0.1096	0.5330	0.0917	0.5890	0.0140	0.9310
Large city	0.0562	0.4860	0.0073	0.9150	0.0139	0.8240	0.0100	0.8600	0.0107	0.9180	0.0050	0.9530	-0.0037	0.9650	0.0132	0.8560
*Experience *A*	0.0008	0.7920	0.0009	0.7500	0.0003	0.9180	0.0010	0.7120	-0.0026	0.4750	-0.0027	0.4650	-0.0029	0.3780	-0.0021	0.5290
*Experience^2 *A*	0.0000	0.4530	0.0000	0.5320	0.0000	0.6160	0.0000	0.5060	0.0000	0.9780	0.0000	0.9940	0.0000	0.9640	0.0000	0.8590
*Tenure *A*	0.0000	0.9920	0.0004	0.8720	-0.0004	0.8760	-0.0008	0.7570	0.0051	0.1950	0.0053	0.1670	0.0047	0.2160	0.0045	0.2360
*Tenure^2 *A*	0.0000	0.9920	0.0000	0.7890	0.0000	0.7860	0.0000	0.6420	-0.0001	0.2650	-0.0001	0.2500	-0.0001	0.3530	-0.0001	0.4260
*Education *A*	-0.0030	0.2980	-0.0016	0.5760	-0.0032	0.1920			-0.0033	0.3760	-0.0027	0.4440	-0.0025	0.4370		
*Middle school *A*							-0.0197	0.4460							-0.0411	0.1660
*Secondary school *A*							-0.0255	0.4790							-0.0409	0.3380
*First degree or above *A*							**-0.0751**	0.0510							-0.0675	0.2040
*Female *A*	-0.0168	0.3840	-0.0126	0.4260	-0.0028	0.8460	-0.0039	0.7870	0.0156	0.4180	0.0146	0.3240	0.0171	0.2790	0.0155	0.3320
*Married *A*	0.0122	0.5260	0.0143	0.4710	0.0105	0.5420	0.0073	0.6740	0.0191	0.4530	0.0065	0.7960	0.0004	0.9860	-0.0067	0.7420
*North *A*	-0.0118	0.6420	-0.0211	0.3810	-0.0119	0.6030	-0.0103	0.6350	-0.0281	0.3740	-0.0214	0.5670	-0.0093	0.8150	-0.0069	0.8590
*South *A*	0.0151	0.7000	0.0169	0.6380	0.0074	0.8440	0.0063	0.8650	0.0537	0.2860	0.0693	0.1580	0.0512	0.3500	0.0499	0.3720
*Year 1998 *A*	0.0280	0.2240	0.0220	0.3300	0.0226	0.3110	0.0224	0.3120	0.0286	0.1910	0.0288	0.1580	0.0286	0.1800	0.0305	0.1450
*Year 2000 *A*	0.0222	0.2370	0.0287	0.2050	0.0283	0.2880	0.0227	0.3830	0.0179	0.3990	**0.0399**	0.0940	0.0439	0.1070	0.0387	0.1470
*Year 2002 *A*	0.0078	0.7680	0.0124	0.6490	0.0095	0.7420	0.0087	0.7650	0.0198	0.5950	0.0260	0.4740	0.0301	0.3990	0.0322	0.3710
*LLM unemploym.t rate*A*	-0.0001	0.9590	-0.0008	0.7430	0.0000	0.9990	0.0000	0.9900	-0.0004	0.9000	-0.0018	0.4750	-0.0006	0.8240	-0.0005	0.8680
*Part-time *A*			0.0021	0.9620	-0.0004	0.9910	-0.0041	0.9190			0.0568	0.1270	0.0490	0.1780	0.0437	0.2240
*SME *A*			0.0090	0.7650	0.0128	0.6830	0.0104	0.7400			-0.0352	0.2790	-0.0250	0.5100	-0.0248	0.5120
*Industrial sector *A*			0.0425	0.2270	0.0185	0.5560	0.0082	0.7910			0.0543	0.2380	0.0304	0.4650	0.0235	0.5670
*Building sector *A*			-0.0325	0.5150	-0.0396	0.3470	-0.0457	0.2740			-0.0045	0.9440	-0.0149	0.7870	-0.0186	0.7330
*Trade sector *A*			0.0256	0.4140	-0.0062	0.8310	-0.0167	0.5610			0.0179	0.6710	-0.0159	0.6760	-0.0236	0.5250
*Transportation sector*A*			0.0001	0.9980	-0.0304	0.4580	-0.0404	0.3190			-0.0272	0.6610	-0.0506	0.3490	-0.0556	0.2910
*Banking and insurance*A*			-0.0318	0.4130	**-0.0747**	0.0480	**-0.0795**	0.0400			-0.0421	0.4220	-0.0773	0.1250	-0.0773	0.1240
*Real estate sector *A*			**0.0726**	0.0730	0.0337	0.4180	0.0234	0.5750			0.0244	0.6040	-0.0144	0.7610	-0.0246	0.5970
*Public sector *A*			0.0361	0.3390	0.0329	0.3510	0.0230	0.5050			0.0204	0.7020	0.0177	0.7470	0.0076	0.8860
*Teacher *A*					-0.0517	0.3840	-0.0447	0.4560					-0.0418	0.5020	-0.0435	0.5100
*Office worker*A*					**0.0291**	0.0900	0.0254	0.1240					0.0223	0.3200	0.0179	0.3630
*Worker supervisor *A*					**0.1294**	0.0010	**0.1300**	0.0010					**0.0867**	0.0100	**0.0824**	0.0160
*Manager *A*					0.0266	0.6990	0.0387	0.5790					-0.0510	0.4780	-0.0483	0.4780

It continues…

Table 9 (continued)

URBAN WAGE STRUCTURE (OLS estimates)

Dependent variable: logarithm of wage	Large city								LLM employment density and large city							
	(9.9)		(9.10)		(9.11)		(9.12)		(9.13)		(9.14)		(9.15)		(9.16)	
	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
LLM employment density																
*Experience *D*									**0.0085**	0.0500	**0.0086**	0.0370	**0.0073**	0.0580	**0.0068**	0.0850
*Experience^2 *D*									-0.0001	0.2400	-0.0001	0.3040	-0.0001	0.3830	-0.0001	0.5540
*Tenure *D*									**-0.0131**	0.0220	**-0.0121**	0.0280	**-0.0125**	0.0460	**-0.0130**	0.0390
*Tenure^2 *D*									**0.0003**	0.0390	**0.0002**	0.0840	**0.0002**	0.0540	**0.0002**	0.0480
*Education *D*									-0.0008	0.8680	0.0020	0.7200	-0.0020	0.6420		
*Middle school *D*															0.0508	0.1760
*Secondary school *D*															0.0313	0.5810
*First degree or above *D*															-0.0249	0.6710
*Female *D*									**-0.0793**	0.0060	**-0.0694**	0.0010	**-0.0518**	0.0140	**-0.0521**	0.0140
*Married *D*									-0.0192	0.5560	0.0179	0.6200	0.0243	0.4520	0.0350	0.2710
*North *D*									-0.0296	0.7880	-0.1023	0.4320	-0.0804	0.5490	-0.0673	0.6100
*South *D*									-0.1890	0.2140	-0.2092	0.1920	-0.2260	0.1780	-0.2524	0.1300
*Year 1998 *D*									0.0080	0.8250	-0.0091	0.7970	-0.0097	0.8180	-0.0143	0.7310
*Year 2000 *D*									0.0186	0.5600	-0.0169	0.6240	-0.0339	0.5090	-0.0345	0.4930
*Year 2002 *D*									-0.0232	0.6010	-0.0308	0.4990	-0.0517	0.3240	-0.0573	0.2790
*LLM unemploym.t rate*D*									0.0025	0.6550	0.0013	0.8010	0.0041	0.4410	0.0060	0.2490
*Part-time *D*											**-0.1297**	0.1020	-0.1160	0.1230	-0.1119	0.1240
*SME *D*											**0.1054**	0.0270	**0.0861**	0.0960	0.0794	0.1200
*Industrial sector *D*											-0.0283	0.6430	-0.0249	0.6580	-0.0329	0.5420
*Building sector *D*											-0.0566	0.4980	-0.0466	0.5000	-0.0518	0.4420
*Trade sector *D*											0.0319	0.5400	0.0380	0.4340	0.0295	0.5330
*Transportation sector *D*											0.0532	0.5860	0.0455	0.6030	0.0338	0.6950
*Banking and insurance*D*											0.0064	0.9220	0.0029	0.9660	-0.0060	0.9300
*Real estate sector *D*											**0.1178**	0.1000	**0.1252**	0.0990	**0.1270**	0.0860
*Public sector *D*											0.0413	0.6130	0.0450	0.4830	0.0449	0.4680
*Teacher *D*													-0.0326	0.8260	-0.0078	0.9560
*Office worker *D*													0.0112	0.7340	0.0145	0.5540
*Worker supervisor * D*													0.0895	0.2540	0.1048	0.1960
*Manager * D*													**0.1825**	0.0170	**0.2088**	0.0080
Constant	0.8143	0.0000	0.9885	0.0000	1.1504	0.0000	1.3212	0.0000	0.7980	0.0000	0.9817	0.0000	1.1448	0.0000	1.3236	0.0000
Observations	22,996	22,996	22,996	22,996	22,996	22,996	22,996	22,996								
R^2	.3291	.3721	.4079	.4065	.3313	.3749	.4105	.4092								

Notes: Regressions are weighted to population proportions and White-robust standard errors adjusted for clustering at the LLM level. The interaction variable "A" (i.e., "agglomeration") is equal to LLM population size in columns (9.1)-(9.4), to LLM employment density in columns (9.5)-(9.8) and (9.13)-(9.16), and to the large city dummy in columns (9.9)-(9.12), while the interaction variable "D" in columns (9.13)-(9.16) refers to LLM employment density. The non-interacted variables are not reported for space constraints.

Figure 1

SPATIAL DISTRIBUTION OF ITALIAN LLM POPULATION

(levels)

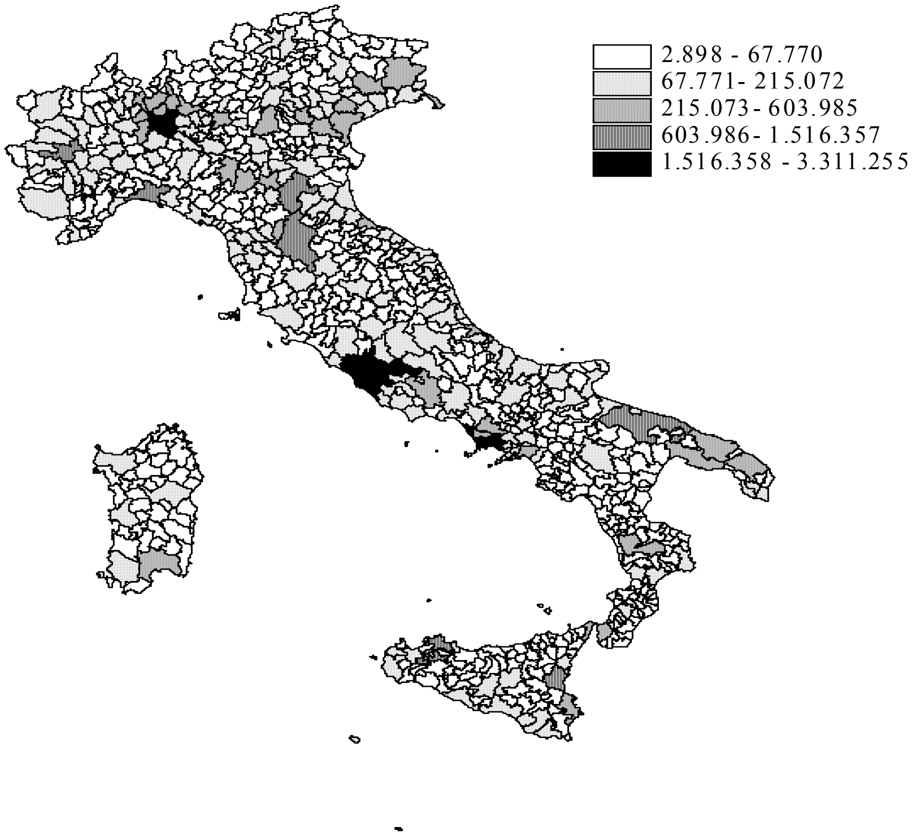


Figure 2

SPATIAL DISTRIBUTION OF LLM COLLEGE GRADUATES

(share in total population)

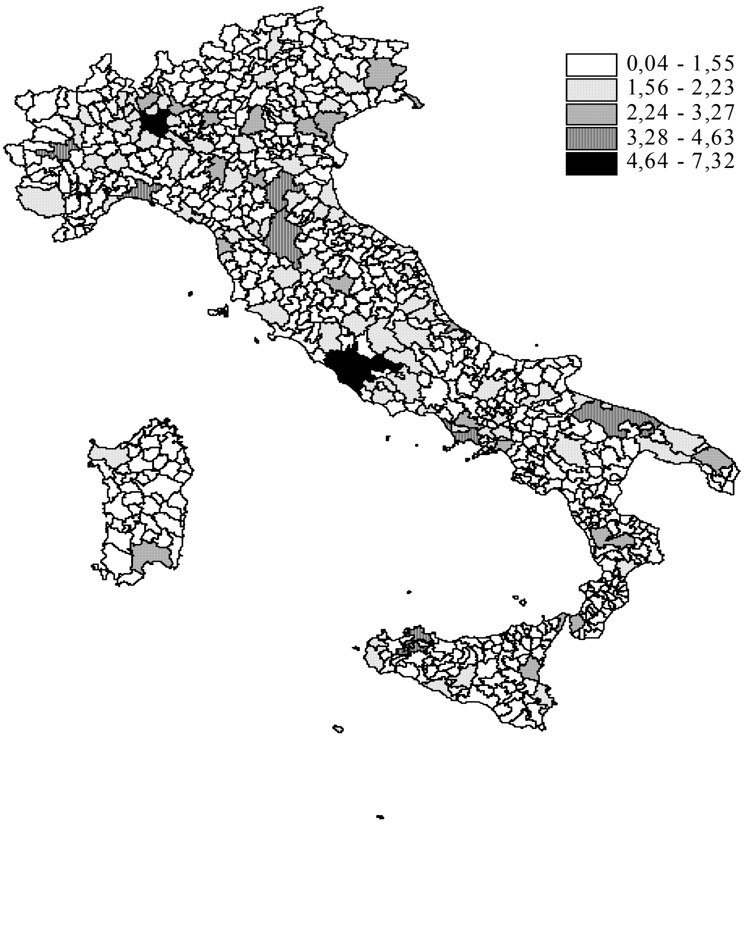


Figure 3

SPATIAL DISTRIBUTION OF LLM UNEMPLOYMENT RATE

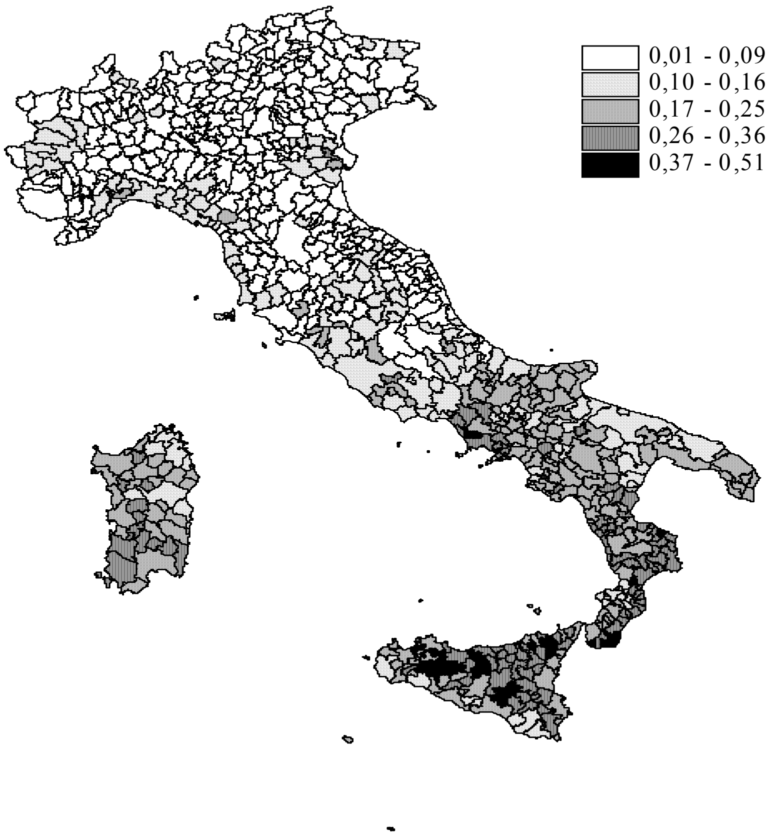
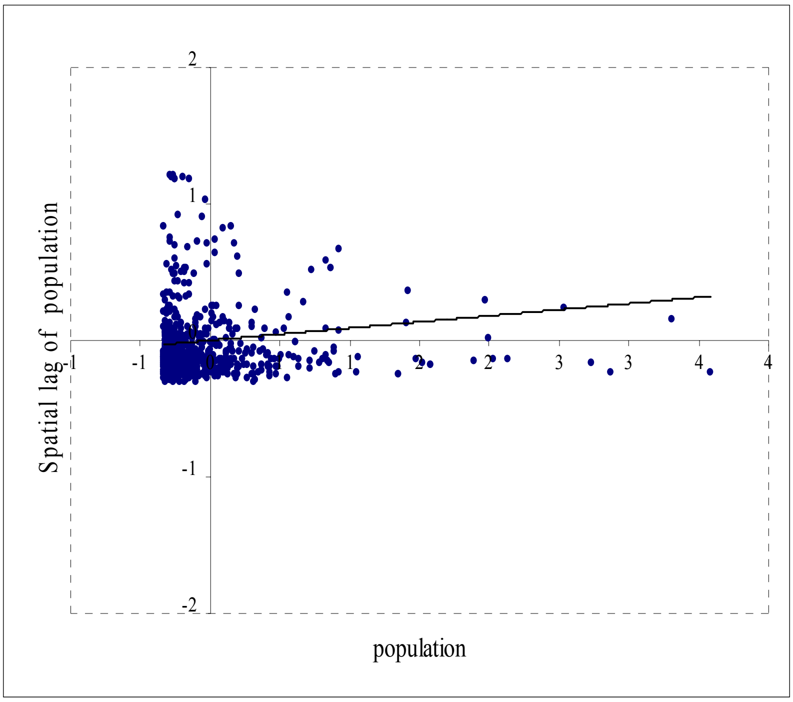


Figure 4

MORAN SCATTERPLOT OF LLM POPULATION



Notes: For each LLM, the spatial lag of population is the weighted average of the population in neighboring locations. The neighborhood set is defined using a k-nearest neighbors weight matrix, with k=5 (see Appendix II).

Appendix I

The Moran Scatterplot and the Local Moran's *I* Statistic

The Moran Scatterplot is a visual device that provides intuition about whether a spatial unit (e.g., the LLM) is similar (or dissimilar) to its neighbors in terms of a given variable. Figure 4 shows the value of the Italian LLM population on the horizontal axis against its spatial lag (i.e., a weighted average of its values in neighboring locations) on the vertical axis. The four quadrants of the scatterplot (centered on the mean) correspond to the four types of spatial associations between a spatial unit and its neighbors. For instance, the first quadrant, HH, contains the areas with a high population value surrounded by zones with high values; the second one, LH, contains the areas with a low value surrounded by regions with high values, etc. Thus, quadrants HH and LL (LH and HL) indicate positive (negative) spatial autocorrelation, showing spatial clustering of similar (dissimilar) values of the LLM population. The linear regression's slope coefficient is, under some assumptions, formally equivalent to Moran's *I* statistic of global spatial autocorrelation. Moran's *I* is defined as:

$$I = \frac{n}{S_0} \frac{\sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij}\left(x_i - \bar{x}\right)(x_j - \bar{x})}{\sum_{i=1}^{n}\left(x_i - \bar{x}\right)^2}$$

where n is the number of observations, x_i denotes the observation on unit i for the variable of interest, $\bar{x}$ its global (national) average and w_{ij} denotes the elements of the spatial weights matrix (see Appendix II). S_0 is a scaling factor equal to the sum of all the elements in the weighting matrix. This statistic summarizes the overall pattern in the data, indicating whether, in the entire sample, the areas with relatively high or low values of a variable (e.g., population) are located close to regions with similar or dissimilar values more often than would be observed if their locations were purely random (see, for instance, Cliff and Ord (1981) for further details).

However, the use of a global statistic does not allow one to assess the presence of spatial clusters at the local level. Conversely, the Moran Scatterplot shows the spatial regime (position across quadrants) of each location, but it does not indicate whether these local spatial associations are significant. This can be detected with local spatial correlation statistics (LISA), which are "local versions" of the Moran's *I* statistic (Anselin, 1995). The local version of Moran's *I* statistic for each spatial unit *i* is defined as follows:

$$I_i = \frac{(x_i - \overline{x})\sum_{j=1}^{n} w_{ij}(x_j - \overline{x})}{\sum_{i=1}^{n}\left(x_i - \overline{x}\right)^2 / n}$$

where n is the number of observations, x_i denotes the observation on unit i for the variable of interest, $\overline{x}$ its global (national) average and w_{ij} denotes the elements of the spatial weights matrix as before. It follows that the global Moran I is related to the local version as follows: $I = \frac{n}{S_0}\sum_{i=1}^{n} I_i$. A positive and significant value of the local statistic indicates spatial clustering of similar values (high or low) between an area and its neighbors, whereas a negative and significant value indicates spatial clustering of dissimilar values. Since in order to detect whether an area with a positive (negative) local statistic is in the HH or LL (HL or LH) spatial regime it is necessary to look at its position in the Moran Scatterplot, the latter is complementary to the LISA.

Appendix II

The spatial association scheme

The specification of the neighborhood set is one of the most delicate methodological issues in spatial data analysis, particularly when dealing with areal units on an irregular grid (like in Italy).

The spatial linkages or proximity of the n observations are summarized by defining a $n \times n$ spatial weighting matrix, $W = \{w_{ij}\}$, where w_{ij} = 1 if sites i and j are designated as neighbors, and w_{ij} = 0 otherwise. Various matrices can be considered.[69] The main methodological concern is related to the problems that may occur when the number of neighbors is allowed to vary. This problem arises with simple contiguity matrices and with distance-based weight matrices, both when using the same fixed distance critical cut-off for all areas and when imposing a common distance-decay criterion. This is of particular relevance in our study as we deal with Italian LLMs, which are more irregular areal units than, for instance, the US States.

Thus, in our analysis we consider a distance-based spatial weight matrix where the critical cut-off is allowed to vary for each area. We use a k-nearest neighbors weight matrix, identifying the critical cut-off for each area so as that each area has the same number of neighbors (k).

[69] A standard approach is to define proximity in terms of contiguity (i.e., areas are designated as neighbors if they share a common boundary). Alternatively, a distance-based spatial weighting matrix can be used. In this case, the most common choices are to consider areas as neighbors if they are within a specified distance threshold value d of each other or to impose a distance decay function, where the weight assigned to each observation is inversely related to its importance.

The spatial connection between areas is calculated from the great circle distance between areas' centroids.[70]

K-nearest neighbors weight matrices are defined as follows.

$$\begin{cases} w_{ij}(k) = 0 \quad if \quad i = j\ ,\ \forall k \\ w_{ij}(k) = 1 \quad if \quad d_{ij} \le d_i(k) \\ w_{ij}(k) = 0 \quad if \quad d_{ij} > d_i(k), \end{cases}$$

where $d_i(k)$ is a critical cut-off distance defined for each region *i*. More precisely, $d_i(k)$ is the k^{th} order smallest distance between regions *i* and *j* such that each region *i* has exactly k neighbors. The matrices are row-standardized so that $W(k)=\{ w^*_{ij}(k) \}$ where $w^*_{ij}(k) = w_{ij}(k) \big/ \sum_j w_{ij}(k)$.

[70] Note that measures of proximity based on economic variables (e.g., volume of trade between LLMs or number of commuters) may be problematic in our context because of the difficulty of finding exogenous weights.

References

Adamson, D. W., D. E. Clark and M. D. Partridge (2004), "Do Urban Agglomeration Effects and Household Amenities Have a Skill Bias?", in *Journal of Regional Science*, No. 44, pp. 201-23.

Anselin, L. (1988), *Spatial Econometrics. Methods and Models*, Dordrecht, Kluwer.

Anselin L. (1995), "Local Indicators of Spatial Association-LISA", in *Geographical Analysis*, No. 27, pp. 93-115.

Anselin L. (1996), "The Moran Scatterplot as an ESDA Tool to Assess Local Instability in Spatial Association", in M. Fisher, H.J. Scholten, and D. Unwin (eds.), *Spatial Analytical Perspectives on GIS*, London, Taylor & Francis.

Au, C. and J. V. Henderson (2004), *Estimating Net Urban Agglomeration Economies with an Application to China*, mimeo.

Becker, S. O., A. Ichino and G. Peri (2003), *How Large is the "Brain Drain" from Italy?*, mimeo.

Beffy, M., M. Buchinsky, D. Fougère, T. Kamionka and F. Kramarz (2004), *The Returns to Seniority in France (and Why they are Lower than in the Unites States)*, mimeo.

Benabou, R. (1993), "Workings of a City: Location, Education, and Production", in *Quarterly Journal of Economics*, No. 108, pp. 619-52.

Black, D., N. Kolesnikova and L. Taylor, (2005), *Understanding Returns to Education When Wages and Prices Vary by Location*, mimeo.

Brunello, G. (2001), "On the Complementarity between Education and Training in Europe", Fondazione Eni Enrico Mattei, Discussion Paper, No. 309.

Cannari, L., F. Nucci and P. Sestito (2000), "Geographic Labor Mobility and the Cost of Housing: Evidence from Italy", in *Applied Economics*, No. 32, pp. 1899-906.

Card, D. (1995), "The Wage Curve: A Review", in *Journal of Economic Literature*, No. 33, pp. 785-799.

Card, D. (2001), "Estimating the Return to Schooling: Progress on some Persistent Econometric Problems", in *Econometrica*, No. 69, pp. 1127-60.

Cliff, A. and J.K. Ord (1981), *Spatial Processes, Models and Applications*, London, Pion.

Ciccone, A. and R. E. Hall (1996), "Productivity and the Density of Economic Activity", in *American Economic Review*, No. 78, pp. 89-107.

Ciccone, A. and G. Peri (2000), "Human Capital and Externalities in Cities", CEPR, Working Paper, No. 2599.

Ciccone, A. (2002), "Agglomeration Effects in Europe", in *European Economic Review*, No. 46, pp. 213-27.

Cingano, F. and F. Schivardi (2004), Identifying the Sources of Local Productivity Growth, in *Journal of the European Economic Association*, No. 2, pp. 720-42.

Combes, P. and G. Duranton (2001), "Labor Pooling, Labor Poaching and Spatial Clustering", CERAS, Working Paper, No. 01-03.

Combes, P., G. Duranton and L. Gobillon (2003), *Spatial Wage Disparities: Sorting Matters!*, mimeo.

de Blasio, G. and S. Di Addario (2005), "Do Workers Benefit from Industrial Agglomeration?", in *Journal of Regional Science,* vol. 45, No. 4, pp. 797-827.

Dell'Aringa, C., C. Lucifora and F. Origo (2005), *Public Sector Reforms and Wage Decentralisation: A First Look at Regional Public-Private Wage Differentials in Italy*, mimeo.

Di Addario, S. (2005), "Job Search in Thick Markets: Evidence from Italy", Oxford Department of Economics, Discussion Paper, No. 235.

Di Addario, S. and E. Patacchini (2005), "Wages and the City: the Italian Case", Oxford Department of Economics, Discussion Paper, No. 243.

Diamond, C. A. and C.J. Simon (1990), "Industrial Specialization and the Returns to Labor", in *Journal of Labor Economics*, No. 2, pp. 175-201.

Duranton, G. and D. Puga (2004), "Micro-foundations of Urban Agglomeration Economies", in J.V. Henderson and J.F. Thisse (eds.), *Handbook of Regional and Urban Economics*, vol. 4, Amsterdam, Elsevier.

Getis, A. and J.K. Ord (1995), "Local Spatial Autocorrelation Statistics: Distributional Issues and an Application", in *Geographical Analysis*, No. 27, pp. 286-305.

Glaeser, E. L. (1999), "Learning in Cities", in *Journal of Urban Economics*, No. 46, pp. 254-77.

Glaeser, E. L., and D. C. Marè (2001), "Cities and Skills", in *Journal of Labor Economics*, No. 19, pp. 316-42.

Glaeser, E. L., and A. Saiz (2003), "The Rise of the Skilled City", Harvard Institute of Economic Research, Discussion Paper, No. 2025.

Gyourko, J., M. Kahn and J. Tracy (1999), "Quality of Life and Environmental Comparisons", in P. Cheshire and E.S. Mills (eds.), *Handbook of Regional and Urban Economics*, vol. 3, Amsterdam, Elsevier.

Helsley, R. W. and W. C. Strange (1990), "Matching and Agglomeration Economies in a System of Cites", in *Regional Science and Urban Economics*, No. 20, pp. 189-212.

Istat (1997), *I sistemi locali del lavoro 1991*, Rome.

Jones, C. I (2002), "Sources of U.S. Economic Growth in a World of Ideas", in *American Economic Review*, No. 92, pp. 220-39.

Kalwij, A. S. and M. Gregory (2004), *A Panel Data Analysis of the Effects of Wages, Standard Hours, and Unionization on Paid Overtime Work in Britain*, mimeo.

Kim, S. (1990), "Labor Heterogeneity, Wage Bargaining, and Agglomeration Economies", in *Journal of Urban Economics*, No. 28, pp. 160-77.

Mincer, J. (1958), "Investment in Human Capital and Personal Income Distribution", in *Journal of Political Economy*, No. 4, pp. 281-302.

Moomaw, R. L. (1983), "Is Population Scale a Worthless Surrogate for Business Agglomeration Economies?", in *Regional Science and Urban Economics*, No. 13, pp. 525-45.

Moretti, E. (2004), "Human Capital Externalities in Cities", in J.V. Henderson and J.F. Thisse (eds.), *Handbook of Regional and Urban Economics*, vol. 4, Amsterdam, Elsevier.

OECD (2002), *Redefining Territories. The Functional Regions*, Paris.

Porter, M. (1990), *The Competitive Advantage of Nations*, New York, The Free Pres.

Psacharopoulos, G. (1994), “Returns to Investment in Education: A Global Update”, in *World Development*, No. 22, pp. 1325-43.

Roback, J. (1982), “Wages, Rents and the Quality of Life”, in *Journal of Political Economy*, No. 90, pp. 1257-78.

Rosenthal, S. S. and W. C. Strange (2004), “Evidence on the Nature and Sources of Agglomeration Economies”, in J.V. Henderson and J.F. Thisse (eds.), *Handbook of Regional and Urban Economics*, vol. 4, Amsterdam, Elsevier.

Rosenthal, S. S. and W. C. Strange (2005), *The Attenuation of Agglomeration Economies: A Manhattan Skyline Approach*, mimeo.

Rosenthal, S. S. and W. C. Strange (2002), *The Urban Rat Race*, mimeo.

Stevens, M. (1994), “A Theoretical Model of On-the-job Training with Imperfect Competition”, in *Oxford Economic Papers*, No. 46, pp. 537-62.

Stevens, M. (2003), “Earning Functions, Specific Human Capital, and Job Matching: Tenure Bias is Negative”, in *Journal of Labor Economics*, No. 21, pp. 783-805.

Tabuchi, T. and A. Yoshida (2000), “Separating Urban Agglomeration Economies in Consumption and Production”, in *Journal of Urban Economics*, No. 48, pp. 70-84.

Topel, R. (1991), “Specific Capital, Mobility, and Wages: Wages Rise with Job Seniority”, in *Journal of Political Economy*, No. 99, pp. 145-76.

Trostel, P., I. Walker and P. Wolley (2002), “Estimates of the Economic Return to Schooling for 28 Countries”, in *Labour Economics*, No. 9, pp. 1-16.

Wooldridge, J. M. (2002), *Econometric Analysis of Cross Section and Panel Data*, Cambridge (MA) and London, The MIT Press.

Wheeler, C. H. (2001), “Search, Sorting, and Urban Agglomeration”, in *Journal of Labor Economics*, No. 19, pp. 879-99.

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N. 546 – *The role of risk aversion in predicting individual behavior*, by L. Guiso and M. Paiella (February 2005).

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1999

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A. CUKIERMAN and F. LIPPI, *Central bank independence, centralization of wage bargaining, inflation and unemployment: theory and evidence*, European Economic Review, Vol. 43 (7), pp. 1395-1434, **TD No. 332 (April 1998)**.

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A. BRANDOLINI, *The distribution of personal income in post-war Italy: Source description, data quality, and the time pattern of income inequality*, Giornale degli economisti e Annali di economia, Vol. 58 (2), pp. 183-239, **TD No. 350 (April 1999)**.

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2000

P. ANGELINI, *Are banks risk-averse? Timing of the operations in the interbank market*, Journal of Money, Credit and Banking, Vol. 32 (1), pp. 54-73, **TD No. 266 (April 1996).**

F. DRUDI and R. GIORDANO, *Default Risk and optimal debt management,* Journal of Banking and Finance, Vol. 24 (6), pp. 861-892, **TD No. 278 (September 1996)**.

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F. FORNARI and R. VIOLI, *The probability density function of interest rates implied in the price of options,* in: R. Violi, (ed.) , Mercati dei derivati, controllo monetario e stabilità finanziaria, Il Mulino, Bologna, **TD No. 339 (October 1998)**.

D. J. MARCHETTI and G. PARIGI, *Energy consumption, survey data and the prediction of industrial production in Italy,* Journal of Forecasting, Vol. 19 (5), pp. 419-440, **TD No. 342 (December 1998)**.

A. BAFFIGI, M. PAGNINI and F. QUINTILIANI, *Localismo bancario e distretti industriali: assetto dei mercati del credito e finanziamento degli investimenti*, in: L.F. Signorini (ed.), Lo sviluppo locale: un'indagine della Banca d'Italia sui distretti industriali, Donzelli, **TD No. 347** (**March 1999)**.

A. SCALIA and V. VACCA, *Does market transparency matter? A case study*, in: Market Liquidity: Research Findings and Selected Policy Implications, Basel, Bank for International Settlements, **TD No. 359 (October 1999)**.

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G. BODO, R. GOLINELLI and G. PARIGI, *Forecasting industrial production in the euro area*, Empirical Economics, Vol. 25 (4), pp. 541-561, **TD No. 370 (March 2000)**.

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C. MICHELACCI and P. ZAFFARONI, *(Fractional) Beta convergence*, Journal of Monetary Economics, Vol. 45, pp. 129-153, **TD No. 383 (October 2000)**.

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2001

M. CARUSO, *Stock prices and money velocity: A multi-country analysis,* Empirical Economics, Vol. 26 (4), pp. 651-72, **TD No. 264 (February 1996)**.

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G. PARIGI and S. SIVIERO, *An investment-function-based measure of capacity utilisation, potential output and utilised capacity in the Bank of Italy's quarterly model*, Economic Modelling, Vol. 18 (4), pp. 525-550, **TD No. 367 (February 2000)**.

F. BALASSONE and D. MONACELLI, *Emu fiscal rules: Is there a gap?,* in: M. Bordignon and D. Da Empoli (eds.), Politica fiscale, flessibilità dei mercati e crescita, Milano, Franco Angeli, **TD No. 375 (July 2000)**.

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D. FOCARELLI and A. F. POZZOLO, *The determinants of cross-border bank shareholdings: An analysis with bank-level data from OECD countries,* Journal of Banking and Finance, Vol. 25 (12), pp. 2305-2337, **TD No. 381 (October 2000)**.

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E. BONACCORSI DI PATTI and G. GOBBI, *The changing structure of local credit markets: Are small businesses special?,* Journal of Banking and Finance, Vol. 25 (12), pp. 2209-2237, **TD No. 404 (June 2001)**.

CORSETTI G., PERICOLI M., SBRACIA M., *Some contagion, some interdependence: more pitfalls in tests of financial contagion,* Journal of International Money and Finance, 24, 1177-1199, **TD No. 408 (June 2001)**.

G. MESSINA, *Decentramento fiscale e perequazione regionale. Efficienza e redistribuzione nel nuovo sistema di finanziamento delle regioni a statuto ordinario,* Studi economici, Vol. 56 (73), pp. 131-148, **TD No. 416 (August 2001)**.

2002

R. CESARI and F. PANETTA, *Style, fees and performance of Italian equity funds,* Journal of Banking and Finance, Vol. 26 (1), **TD No. 325 (January 1998)**.

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F. FORNARI, C. MONTICELLI, M. PERICOLI and M. TIVEGNA, *The impact of news on the exchange rate of the lira and long-term interest rates*, Economic Modelling, Vol. 19 (4), pp. 611-639, **TD No. 358 (October 1999**).

D. FOCARELLI, F. PANETTA and C. SALLEO, *Why do banks merge?*, Journal of Money, Credit and Banking, Vol. 34 (4), pp. 1047-1066, **TD No. 361 (December 1999)**.

D. J. MARCHETTI, *Markup and the business cycle: Evidence from Italian manufacturing branches*, Open Economies Review, Vol. 13 (1), pp. 87-103, **TD No. 362 (December 1999**).

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F. PANETTA, *The stability of the relation between the stock market and macroeconomic forces*, Economic Notes, Vol. 31 (3), **TD No. 393 (February 2001)**.

G. GRANDE and L. VENTURA, *Labor income and risky assets under market incompleteness: Evidence from Italian data*, Journal of Banking and Finance, Vol. 26 (2-3), pp. 597-620, **TD No. 399 (March 2001)**.

A. BRANDOLINI, P. CIPOLLONE and P. SESTITO, *Earnings dispersion, low pay and household poverty in Italy, 1977-1998*, in D. Cohen, T. Piketty and G. Saint-Paul (eds.), The Economics of Rising Inequalities, pp. 225-264, Oxford, Oxford University Press, **TD No. 427 (November 2001)**.

L. CANNARI and G. D'ALESSIO, *La distribuzione del reddito e della ricchezza nelle regioni italiane*, Rivista Economica del Mezzogiorno (Trimestrale della SVIMEZ), Vol. XVI (4), pp. 809-847, Il Mulino, **TD No. 482 (June 2003)**.

2003

F. SCHIVARDI, *Reallocation and learning over the business cycle*, European Economic Review, , Vol. 47 (1), pp. 95-111, **TD No. 345 (December 1998)**.

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P. ANGELINI and N. CETORELLI, *The effect of regulatory reform on competition in the banking industry*, Federal Reserve Bank of Chicago, Journal of Money, Credit and Banking, Vol. 35, pp. 663-684, **TD No. 380 (October 2000)**.

P. PAGANO and G. FERRAGUTO, Endogenous growth with intertemporally dependent preferences, Contribution to Macroeconomics, Vol. 3 (1), pp. 1-38, **TD No. 382 (October 2000).**

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M. PERICOLI and M. SBRACIA, *A Primer on Financial Contagion*, Journal of Economic Surveys, Vol. 17 (4), pp. 571-608, **TD No. 407 (June 2001)**.

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E. GAIOTTI and A. GENERALE, *Does monetary policy have asymmetric effects? A look at the investment decisions of Italian firms*, Giornale degli Economisti e Annali di Economia, Vol. 61 (1), pp. 29-59, **TD No**. **429 (December 2001)**.

L. GAMBACORTA, *The Italian banking system and monetary policy transmission: evidence from bank level data*, in: I. Angeloni, A. Kashyap and B. Mojon (eds.), Monetary Policy Transmission in the Euro Area, Cambridge, Cambridge University Press, **TD No. 430 (December 2001).**

M. EHRMANN, L. GAMBACORTA, J. MARTÍNEZ PAGÉS, P. SEVESTRE and A. WORMS, *Financial systems and the role of banks in monetary policy transmission in the euro area*, in: I. Angeloni, A. Kashyap and

B. Mojon (eds.), Monetary Policy Transmission in the Euro Area, Cambridge, Cambridge University Press, **TD No. 432 (December 2001)**.

F. SPADAFORA, *Financial crises, moral hazard and the speciality of the international market: further evidence from the pricing of syndicated bank loans to emerging markets*, Emerging Markets Review, Vol. 4 (2), pp. 167-198, **TD No. 438 (March 2002)**.

D. FOCARELLI and F. PANETTA, *Are mergers beneficial to consumers? Evidence from the market for bank deposits*, American Economic Review, Vol. 93 (4), pp. 1152-1172, **TD No. 448 (July 2002)**.

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M. PAGNINI, *Misura e Determinanti dell'Agglomerazione Spaziale nei Comparti Industriali in Italia*, Rivista di Politica Economica, Vol. 3 (4), pp. 149-196, **TD No. 452 (October 2002)**.

F. BUSETTI and A. M. ROBERT TAYLOR, *Testing against stochastic trend and seasonality in the presence of unattended breaks and unit roots*, Journal of Econometrics, Vol. 117 (1), pp. 21-53, **TD No. 470 (February 2003)**.

2004

F. LIPPI, *Strategic monetary policy with non-atomistic wage-setters*, Review of Economic Studies, Vol. 70 (4), pp. 909-919, **TD No. 374 (June 2000)**.

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M. BUGAMELLI and P. PAGANO, *Barriers to Investment in ICT*, Applied Economics, Vol. 36 (20), pp. 2275-2286, **TD No. 420 (October 2001)**.

A. BAFFIGI, R. GOLINELLI and G. PARIGI, *Bridge models to forecast the euro area GDP*, International Journal of Forecasting, Vol. 20 (3), pp. 447-460,**TD No. 456 (December 2002)**.

D. AMEL, C. BARNES, F. PANETTA and C. SALLEO, *Consolidation and Efficiency in the Financial Sector: A Review of the International Evidence*, Journal of Banking and Finance, Vol. 28 (10), pp. 2493-2519, **TD No. 464 (December 2002)**.

M. PAIELLA, *Heterogeneity in financial market participation: appraising its implications for the C-CAPM*, Review of Finance, Vol. 8, pp. 1-36, **TD No. 473 (June 2003)**.

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E. BONACCORSI DI PATTI and G. DELL'ARICCIA, *Bank competition and firm creation*, Journal of Money Credit and Banking, Vol. 36 (2), pp. 225-251, **TD No. 481 (June 2003)**.

R. GOLINELLI and G. PARIGI, *Consumer sentiment and economic activity: a cross country comparison*, Journal of Business Cycle Measurement and Analysis, Vol. 1 (2), pp. 147-172, **TD No. 484 (September 2003)**.

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E. GAIOTTI and F. LIPPI, *Pricing behavior and the introduction of the euro:evidence from a panel of restaurants*, Giornale degli Economisti e Annali di Economia, 2004, Vol. 63(3/4):491-526, **TD No. 541 (February 2005)**.

2005

L. DEDOLA and F. LIPPI, *The monetary transmission mechanism: evidence from the industries of 5 OECD countries,* European Economic Review, 2005, Vol. 49(6): 1543-69, **TD No. 389 (Decembre 2000)**.

G. DE BLASIO and S. DI ADDARIO, *Do workers benefit from industrial agglomeration?* Journal of regional Science, Vol. 45 n.4, pp. 797-827, **TD No. 453 (October 2002).**

M. OMICCIOLI, *Il credito commerciale: problemi e teorie,* in L. Cannari, S. Chiri e M. Omiccioli (a cura di), *Imprese o intermediari? Aspetti finanziari e commerciali del credito tra imprese in Italia*, Bologna, Il Mulino, **TD No. 494 (June 2004)**.

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A. CARMIGNANI, *Funzionamento della giustizia civile e struttura finanziaria delle imprese: il ruolo del credito commerciale,* in L. Cannari, S. Chiri e M. Omiccioli (a cura di), *Imprese o intermediari? Aspetti finanziari e commerciali del credito tra imprese in Italia*, Bologna, Il Mulino, **TD No. 497 (June 2004)**.

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